PIT AND QUARRY

PERIODICAL DIVISION LIBRARY OF CONGRESS JUN -6 1940

JUNE, 1940

Millard Plant Adds All-Welded Rotary Lime Kiln . . . Maine Feldspar Plant Doubles Its Output . . . Cost Keeping for Superintendents . . . Low-Cost Floors of Concrete

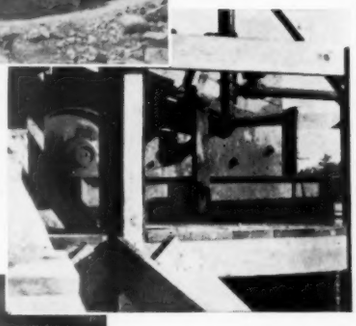
TELSMITH

EQUIPPED GRAVEL PLANT SUCCESSFULLY SERVES

Boston Market

General View Crystal Concrete Products Co. Plant

13-B Telsmith Primary Breaker crushes the large boulders to 3 to 4 inches



4-foot x 12-foot Telsmith Triple Deck Pulsator

8-B Telsmith Gyratory Crusher reduces over size from Primary Breaker

Two of the three Telsmith Sand Tanks

● Supplying the Boston market with sand, gravel, and ready-mixed concrete—this new and completely modern Telsmith-equipped plant of the Crystal Concrete Products Co. at Braintree, Mass., is closer to Boston than any other plant of comparable size.

The plant's principal owner, Mr. Thomas A. Hannaford, is both an experienced and large-scale operator. The use of Telsmith equipment is doubly significant.

The bank covers about 150 acres . . . and the plant is now producing 125 tons an hour of 1½-inch and down. This is not top capacity by any means. Even in its breaking-in period the plant produced considerably more.

The equipment, in its flow sheet order, includes: 24″ Telsmith Plate Feeder; 13-B Telsmith Primary Breaker crushing large boulders to 3 to 4″ size; 30″ x 76′ Steel Frame Main Belt Conveyor; 4′ x 10′ Telsmith Single Deck Pulsator; 8-B Telsmith Gyratory Crusher crushing oversize from the primary breaker; 18″ x 79′ Steel Frame Return Belt Conveyor; 24″ x 129′ Steel Frame Main Belt Conveyor; 4′ x 12′ Telsmith Triple Deck Pulsator; one No. 7 and two No. 8 Telsmith Sand Tanks; four Duplex and three Simplex Telsmith Bin Gates, 15″ x 15″.

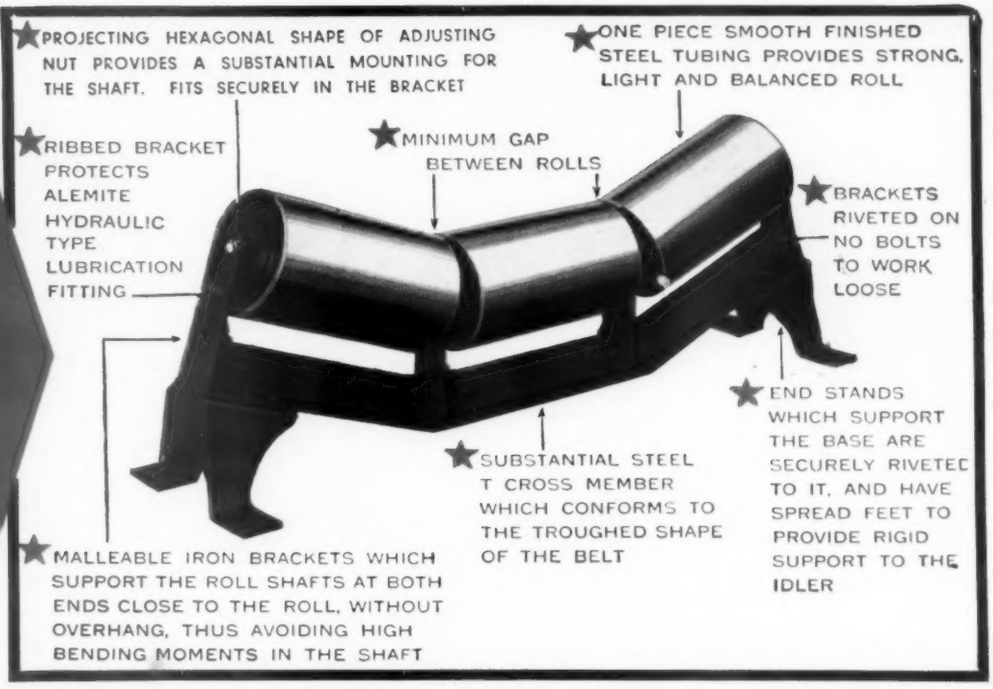
Like all Telsmith-equipped plants, the operation of this one has been more than satisfactory from the start. Every individual Telsmith unit does its job, with a minimum of attention and upkeep. The entire ensemble runs smoothly —*and profitably*. Planning a new quarry or gravel plant? Modernizing? *Find out* about Telsmith engineering service and guaranteed results. *Get Bulletin G-15.*

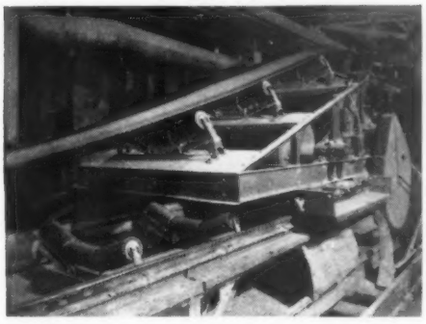
G-5-40

SMITH ENGINEERING WORKS, 504 EAST CAPITOL DRIVE, MILWAUKEE, WISCONSIN

50 Church St., New York City
211 W. Wacker Drive, Chicago, Ill.
713 Commercial Trust Bldg., Philadelphia, Pa.
81 Binney St., Cambridge, Mass.
Van Wheeler Equip. Co., Columbus, Ohio
Bowles M. & S. Co., Louisville, Ky.
Charleston Trac. & Equip. Co., Charleston, W. Va.
Roanoke Trac. & Equip. Co., Roanoke, Va.
Choctaw C. & M. Co., Memphis, Tenn.
Wilson-Wessner-Wilkinson Co., Knoxville and Nashville, Tenn.
United Steel Sales, Toronto, Ont.

THIS *is where* BELT CONVEYOR ECONOMY *Begins!*


PROJECTING HEXAGONAL SHAPE OF ADJUSTING NUT PROVIDES A SUBSTANTIAL MOUNTING FOR THE SHAFT. FITS SECURELY IN THE BRACKET
ONE PIECE SMOOTH FINISHED STEEL TUBING PROVIDES STRONG, LIGHT AND BALANCED ROLL
RIBBED BRACKET PROTECTS ALEMITE HYDRAULIC TYPE LUBRICATION FITTING
MINIMUM GAP BETWEEN ROLLS
BRACKETS RIVETED ON NO BOLTS TO WORK LOOSE
END STANDS WHICH SUPPORT THE BASE ARE SECURELY RIVETED TO IT, AND HAVE SPREAD FEET TO PROVIDE RIGID SUPPORT TO THE IDLER
SUBSTANTIAL STEEL T CROSS MEMBER WHICH CONFORMS TO THE TROUGHED SHAPE OF THE BELT
MALLEABLE IRON BRACKETS WHICH SUPPORT THE ROLL SHAFTS AT BOTH ENDS CLOSE TO THE ROLL, WITHOUT OVERHANG, THUS AVOIDING HIGH BENDING MOMENTS IN THE SHAFT



30" wide anti-friction belt conveyor handling 400 tons of minus 1" gold ore per hour, working 16 hours per day, or at the rate of 6000 tons per day—half of this volume being a circulating load. The tripper is of all-steel construction, completely automatic, electrically controlled.

• Dependability in a belt conveyor installation rests principally with the troughing and return idlers. They are the heart of the equipment—the "roadbed" for the belt.

Link-Belt engineers pioneered in the development of anti-friction belt conveyor idlers, with bearings enclosed within the roll, operating in a grease reservoir and protected from grit and dirt by labyrinth grease seals. They have constantly developed this fundamental design — improved the grease seal, bearing adjustment, shaft mounting and other parts.

Handles Many Materials

Today, Link-Belt designs offer the best in belt conveyor equipment for handling a wide range of materials at high and low capacities, with low power and maintenance cost and maximum belt life. These are reasons why you read of so many case histories of Link-Belt belt conveyor economy.

A Complete Line

Link-Belt makes a complete line of anti-friction idlers, with steel rolls, for light, medium, and heavy duty, as well as of cast iron, brass and other metals, to meet specific conditions.

New Developments

A more recent Link-Belt development is the positive self-aligning idler for automatically maintaining the proper position of the belt, without injury to its edges. We also make rubber-covered conveyor rolls for heavy-duty service at loading points, and a self-guiding belt conveyor system which occupies minimum headroom, yet embodies all features for positive belt alignment.

Engineering Service

Get information now on better belt conveyor equipment—whether for modernization or new installation needs. Write to our nearest office.

LINK-BELT COMPANY, *Plants at* Chicago, Indianapolis, Philadelphia, Atlanta, Dallas, San Francisco, Toronto. Offices and warehouses in principal cities. 8105

LINK-BELT

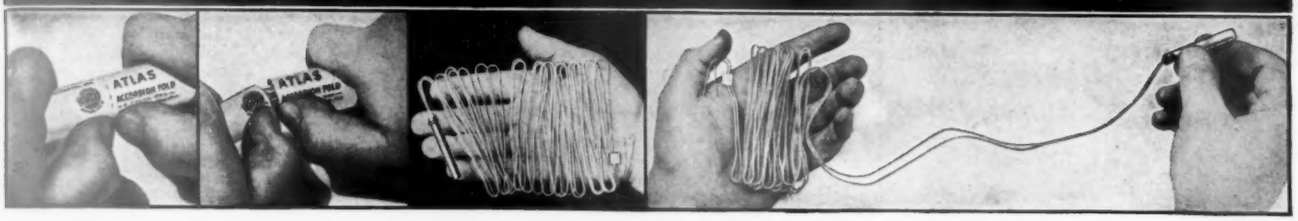
A TYPE FOR EVERY SERVICE

BELT CONVEYOR EQUIPMENT

IDLERS • TRIPPERS • BELTS • PULLEYS • BEARINGS • TAKE-UPS • DRIVES

PIT AND QUARRY, June, 1940, Vol. 32, No. 12. Published monthly by the Complete Service Publishing Company, 538 South Clark Street, Chicago, Ill. Subscription price $1 for 1 year in the U.S. and possessions, Canada, Central and South America; elsewhere $1 additional for each year. Single copies 20 cents. Entered as second-class matter February 28, 1932, at the Post Office at Chicago, Ill., under the act of March 3, 1897.

Simple Yet Effective Performance —*At Least* One Hundred Million Times!



Atlas **ACCORDION FOLD** Electric Blasting Caps

ATLAS ACCORDION Fold Electric Blasting Caps have been used at least one hundred million times! That's a lot of shots in any language—and it speaks volumes in proving the advantages of the Accordion Fold package.

The cap is packed in the center of forty-eight folds of wire (held securely by the heavy paper tube) to protect the detonator. Yet the complete package is the last word in compactness and convenience, as well as safety!

The Atlas Accordion Fold individual package is handy to carry—easy to open—a slight pressure of the fingers "does the trick." Wires extend easily and naturally into position without kink or snarl. Cap end is easily straightened out for priming without disturbing the rest of the accordion fold.

For the easiest, simplest, safest method of handling electric blasting . . . ask the Atlas Representative about Atlas Manasite Electric Blasting Caps in the Accordion Fold package.

ATLAS POWDER COMPANY, WILMINGTON, DEL.

Cable Address—Atpowco

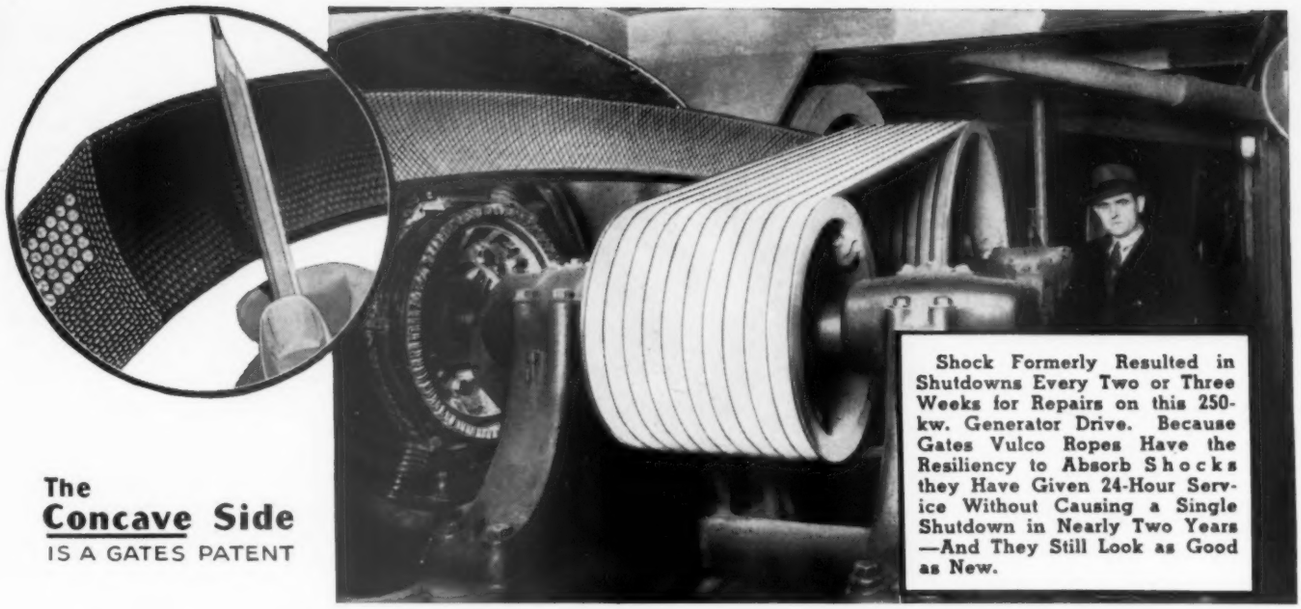
Everything for Blasting

OFFICES

Allentown, Pa.	Houghton, Mich.	New Orleans, La.	Pittsburgh, Pa.	Spokane, Wash.
Boston, Mass.	Joplin, Mo.	New York, N. Y.	Portland, Oregon	St. Louis, Mo.
Butte, Mont.	Knoxville, Tenn.	Philadelphia, Pa.	Salt Lake City, Utah	Tamaqua, Pa.
Chicago, Ill.	Los Angeles, Calif.	Picher, Okla.	San Francisco, Calif.	Wilkes-Barre, Pa.
Denver, Colo.		Pittsburg, Kansas	Seattle, Wash.	

ATLAS
EXPLOSIVES

CHEMICALS ATLAS EXPLOSIVES



The **Concave Side** IS A GATES PATENT

Shock Formerly Resulted in Shutdowns Every Two or Three Weeks for Repairs on this 250-kw. Generator Drive. Because Gates Vulco Ropes Have the Resiliency to Absorb Shocks they Have Given 24-Hour Service Without Causing a Single Shutdown in Nearly Two Years —And They Still Look as Good as New.

Just by Bending *Any* V-Belt

AS IT BENDS IN GOING AROUND ITS PULLEY YOU'LL LEARN OF A

REAL SAVING

. . . . in Belt and Power Costs

What Happens When a V-Belt Bends

FIG. 1

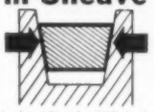
FIG. 2

As a V-belt bends, you can actually feel its sides change shape! The top of the belt is under tension and grows narrower (see figure 1, at left). The bottom is under pressure—therefore it widens. These stresses force a straight-sided V-belt to bulge in the sheave groove (Fig. 1), and this produces uneven wear on the belt sides, resulting in *shorter life!*

Now look at figure 2. There you see how the concave side of the Gates Vulco Rope (U. S. Patent 1,400,539) exactly corrects this bulging. It insures a perfect fit in the sheave groove with uniform side-wall wear and, therefore, longer life! It insures that the entire side-wall grips the pulley—heavier loads are carried without slippage—belts are saved and power consumption reduced.

The Gates Vulco Rope is the only V-belt built with the patented concave side.

V-Belt in Sheave



It's the *sides* of a V-Belt that do all the *gripping* and get all the *wear*. That's why longer life for the *sides* means *longer life for the belt.*

THE GATES RUBBER COMPANY

Engineering Offices and Stocks in All Large Industrial Centers

GATES VULCO ROPE DRIVES

CHICAGO, ILL., 1524 South Western Ave. HOBOKEN, N. J., Terminal Building BIRMINGHAM, ALA., 1631 1st Ave., S. LOS ANGELES, CAL., 2240 E. Wash. Blvd.

DENVER, COLO., 999 South Broadway DALLAS, TEX., 2213 Griffin Street PORTLAND, ORE., 333 N. W. 5th Ave. SAN FRANCISCO, CAL., 2700 16th St.

TOWER Pneumatic Hose

HOLDS THE AIR LONGER

● It's a long program when you put Republic's Tower Pneumatic Hose on the job—provides long service life in all kinds of heavy-duty pneumatic tool work. Tower is built with the characteristic brown cover that has become famous for showing no signs of punishment, three plies of multiple-braided cords and a highly oil-resistant, non-flaking tube . . . for efficient operation under heavy compressor pulsations and to withstand abuses such as excess abrasion, crushing, presence of oil and harsh weather conditions. This type of rugged construction, without impaired flexibility, makes Tower a valuable piece of equipment in every sense. Its longer performance means minimum cost. Your Republic Distributor is a reliable source of information on this and other Republic Hose. REPUBLIC RUBBER DIVISION OF LEE RUBBER AND TIRE CORP., YOUNGSTOWN, O.

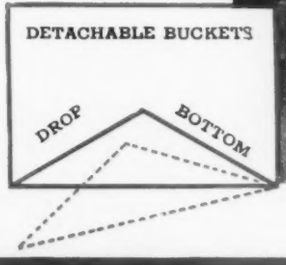
REPUBLIC RUBBER

HOSE • BELTING • PACKING • MOLDED PRODUCTS

DEMPSTER DUMPSTER *Pays its Way!*

Quarry operators from coast to coast are swinging to Dempster-Dumpster. One unit serves as many as 10 detachable buckets . . . does the work of five trucks. Loading goes on constantly with no loss of man-hours. Drop bottom buckets in capacities up to 4 cubic yards handling the heaviest of materials and up to 6 cu. yds. handling lighter materials are giving an excellent account of themselves according to their owners. Learn all about this revolutionary new haulage system. There's a dealer near you, or write us direct.

- No High Pressure Hose
- No Counterweight
- No Auxiliary Jacks



Above is Model 300 LF (3 cu. yds. water level).

DEMPSTER BROTHERS, Inc. KNOXVILLE, TENNESSEE

Fine-run Bank or Cobble-filled Strata...

The CHEAPEST Way to Get Out Real PRODUCTION is with a HAISS LOADER

Consider What You Get in a HAISS Model 80 — and what the machine will do...

- **HIGH CAPACITY**—3 to 5 yards-a-minute—fast enough to load and dispatch big trucks without waiting.
- **LOW COSTS**—All the power you need yet your gasoline bill is for a 60 H.P. motor only. Anyone can operate the loader. Upkeep is not over ½¢ a yard. Depreciation is low, in proportion to the relatively low first cost.
- **MANEUVERABILITY**—The "Gravel Bank Special" Model 80 has creepers 16 in. wide x 7 ft. 6 in. between sprocket centers. Will handle readily on soft ground.
- **DIGGING EFFICIENCY**—Haiss feeding propellers and power crowding drive at 5 ft. per min. Exclusively a Haiss advantage since 1918.
- **AVALANCHE PROTECTION**—Note how the forward end of the creepers are housed, so the machine can pull out easily if a caving bank buries the digging end.
- **COBBLE PROTECTION**—If for use in a cobble-filled bank, special Cobble Guard Plates and Master Propellers will prevent the jamming of the feeding device.

5 GREAT HAISS LOADERS

MODEL 135—8 yds. per minute, creeper mounted.

MODEL 80—3 to 5 yds. per minute, creeper mounted.

MODEL 77—3 to 4 yds. per minute on creepers or on wheels.

MODEL 75W—3 yds. per minute, on pneumatic-tired wheels.

MODEL 75 — 3 yds. per minute, on creeper treads

This is a Machine with which to MAKE MONEY in the sand and gravel business—BIG AND STRONG ENOUGH (24,000 lbs.) to stand up to a real job, yet LOADER-PRICED.

CLIP THE COUPON

George Haiss Mfg. Co., Inc.
140th St. & Rider Ave., New York, N. Y.

Please send me your latest bulletin on a Model ..... Haiss Loader.

Name of Individual.....

Name of Company.....

Address.....

City & State.....

CHOOSE IT *right*

Primacord
BICKFORD
DETONATING
FUSE
New Information on
Primacord
BICKFORD
Detonating Fuse
THREE TYPES NOW AVAILABLE
PLAIN—for practically all holes and for general use in connecting holes.
REINFORCED—stronger than double countered Cordeau, for use in deep holes where extra tensile strength or resistance to abrasion is desirable.
WIRE BOUND—for extremely rugged deep holes or where maximum resist-
since to abrasion is important.

Each of these three types of Primacord-Bickford Detonating Fuse has been developed to meet a particular need, as shown above. Check the job you have to do, and choose the right type of Primacord for that job.

Primacord carries a powerful detonating wave into each bore hole. Because Primacord is insensitive to friction, fire and ordinary shock, its storage, handling and hook-up are simplified; hazard reduced, economies effected, and greater efficiency obtained in large and intricate blasting operations.

We'll be glad to send you full information.

PRIMACORD·BICKFORD

Detonating FUSE

PB21

THE ENSIGN-BICKFORD CO., Simsbury, Conn.

Makers of Cordeau Bickford Detonating Fuse — and Safety Fuse since 1836

1. Tie through cartridge.
2. Half hitch branch *to* main line.
3. Connect main line lengths with *square* knot.
4. Fuse and cap on end of main line.

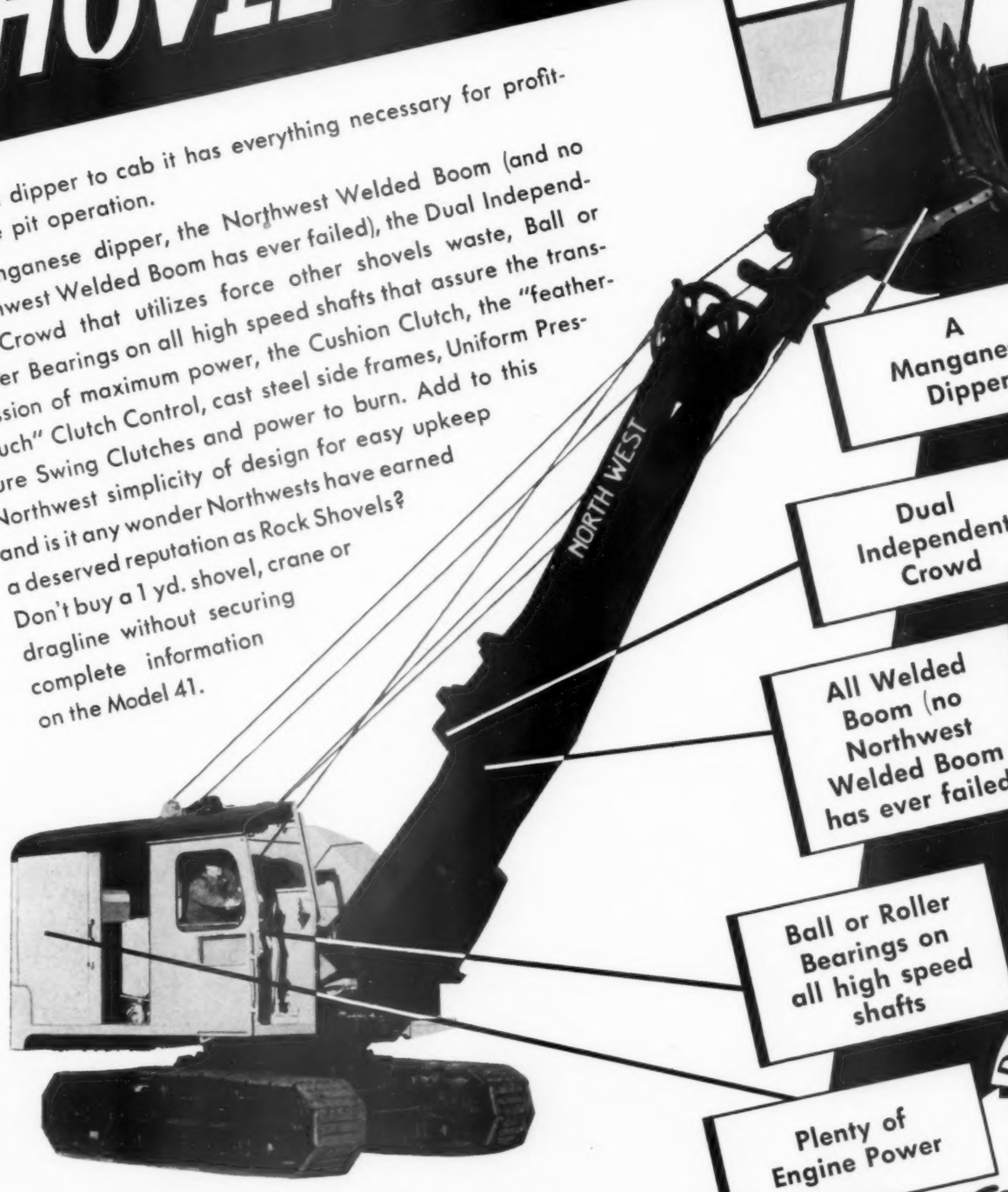
Important: Branch lines should lead away from main lines at *right angles*. Avoid kinks and small loops.

A REAL ROCK SHOVEL this- Model 41

FROM dipper to cab it has everything necessary for profitable pit operation.

A manganese dipper, the Northwest Welded Boom (and no Northwest Welded Boom has ever failed), the Dual Independent Crowd that utilizes force other shovels waste, Ball or Roller Bearings on all high speed shafts that assure the transmission of maximum power, the Cushion Clutch, the "feather-touch" Clutch Control, cast steel side frames, Uniform Pressure Swing Clutches and power to burn. Add to this Northwest simplicity of design for easy upkeep and is it any wonder Northwests have earned a deserved reputation as Rock Shovels?

Don't buy a 1 yd. shovel, crane or dragline without securing complete information on the Model 41.



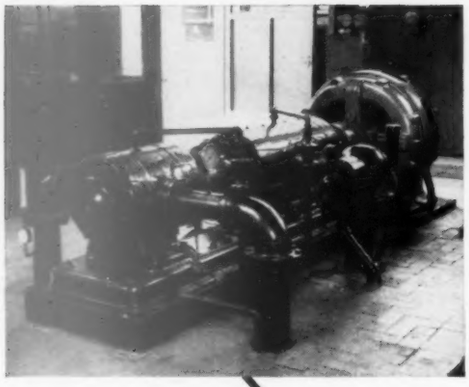
- A Manganese Dipper
- Dual Independent Crowd
- All Welded Boom (no Northwest Welded Boom has ever failed)
- Ball or Roller Bearings on all high speed shafts
- Plenty of Engine Power

DUAL CROWD
INDEPENDENT PLUS AUTOMATIC
Digging Power Plus

NORTHWEST ENGINEERING COMPANY
1822 Steger Building, 28 East Jackson Boulevard, Chicago, Illinois

NORTHWEST

A real Rock Shovel



WHY continue the old custom of compressing air at one central point, using large-size high-pressure units, working on pressures equal to the highest demand from any part of the plant?

WHY compress air to a hundred pounds, or even higher, and then reduce it to lower pressures at the point of use?

WHY use long distance pipe lines, with consequent leaks, and pay the added expense to prevent such leaks?

WHY pay out in power bills the excessive cost of forcing air through long transmission lines? Friction losses are direct losses.

WHY take up valuable floor space and construct heavy, costly foundations?

WHY waste money when these objections, and many others can be eliminated by installing Fuller Rotary Compressors and Vacuum Pumps?

YOUR COMPRESSORS — spot — WHERE YOU NEED THE AIR

Fuller Rotary Compressors, single and two-stage, are available in a full range of capacities to 1800 c.f.m. actual free air delivery . . . working pressures to 125 lb. gage. Also used as Vacuum pumps . . . single stage designed for dead end vacuums to 29.3" and compound machines to 29.75" referred to 30" barometer.

FULLER COMPANY

CATASAUQUA, PENNSYLVANIA

Chicago: 1118 Marquette Bldg.

San Francisco: 320-321 Chancery Bldg.

Direct drive

Easy to operate

Low maintenance

Simple foundations

No bearing take-up

Small space required

Parts readily accessible

No air-line pulsations

Sturdy yet light in weight

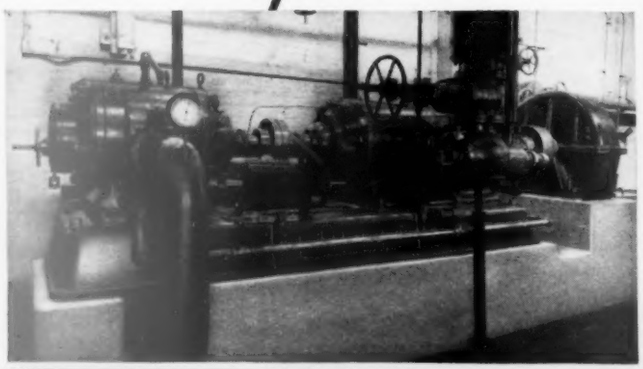
Blades automatically compensate for wear

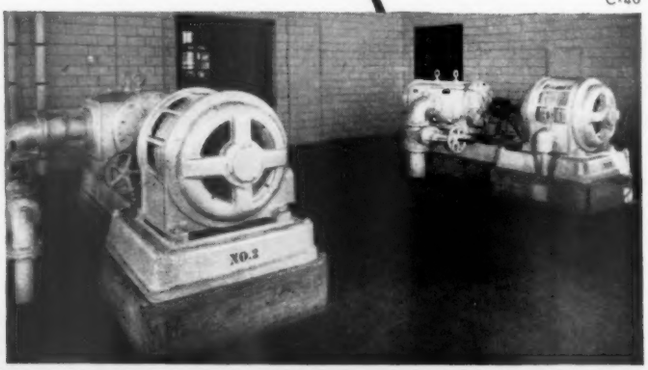
No valves to leak or seats to grind

Unnecessary bulk eliminated

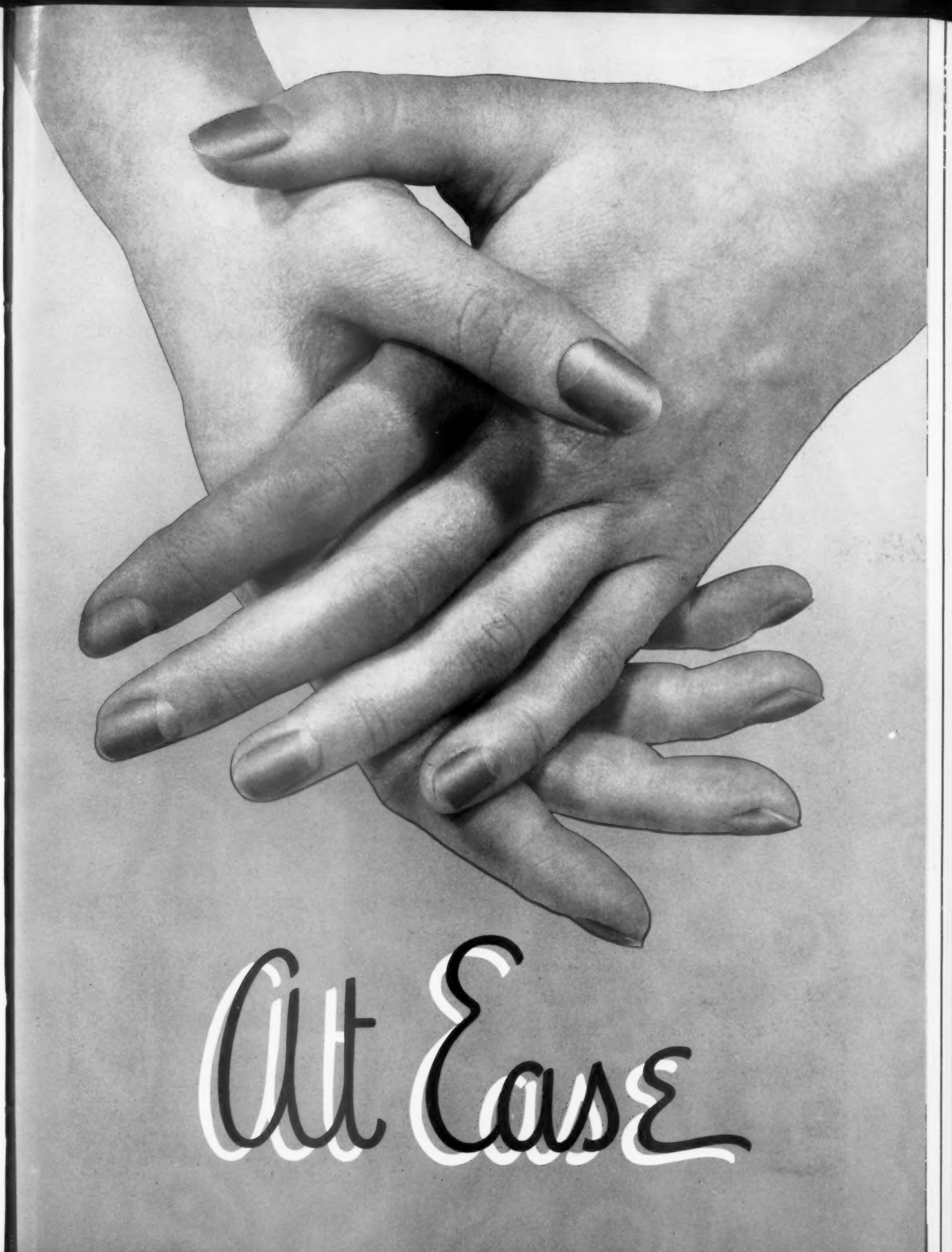
Maintained capacities for the life of the machine.

C-40





FULLER-KINYON, FLUXO, AND AIRVEYOR CONVEYING SYSTEMS · · · · ROTARY FEEDERS AND DISCHARGE GATES
ROTARY AIR COMPRESSORS AND VACUUM PUMPS · · · · AIR-QUENCHING COOLERS · · · · BIN SIGNALS


At Ease

HAZARD WIRE ROPE

HAZARD LAY-SET PREFORMED

HAZARD LAY-SET *Preformed...* *At Ease* on every job

● Regardless of the machine or job—shovel, crane, hoist, scraper, elevator, whatnot—Hazard LAY-SET Preformed will give you the same amazing resistance to fatigue, the same uniformly long life—because Hazard LAY-SET is *"at ease."* The preforming process at the mill relieves the rope of locked up stresses; leaves it flexible, easy to handle, willing to work. Hazard LAY-SET Preformed is so calm, so thoroughly "at ease," that it has almost no tendency to kink, it resists whipping or rotating in sheave grooves, it spools better. More than this Hazard LAY-SET Preformed is a safer rope to handle. Being "at ease" broken crown wires do not spring out to tear workmen's hands and possibly cause blood-poisoning. For your next rope specify Hazard LAY-SET Preformed and be "at ease" yourself about its greater dollar value.

HAZARD WIRE ROPE DIVISION • WILKES-BARRE, PENNSYLVANIA

Established 1846

District Offices: New York, Chicago, Philadelphia, Pittsburgh, Fort Wayne, San Francisco, Denver, Los Angeles, Atlanta, Tacoma

GREEN SIGNIFIES SAFETY

AMERICAN CHAIN & CABLE COMPANY, Inc.

6M-P-R

HAZARD WIRE ROPE

SOLVING *the*

Small Job Problem

THE SMALL bituminous job now offers new profits to the contractor — and real savings to the Engineer.

Barber-Greene announces the Maintenance Plant *designed for the small job.*

For the first time, the small job can be done *correctly* and *profitably.*

The B-G Maintenance Plant is built for those 3 or 4 block jobs, for short resurfacing stretches, for alleys, patching, and the other innumerable small tonnage jobs that have been inadequately done or have cost too much. It is complete. With the working materials ready, all you need is the trucks to haul away the finished mix.

The Portability, Flexibility, and High Capacity of this new Barber-Greene are outstanding achievements in machine design.

A folder giving the many interesting facts is yours without obligation.

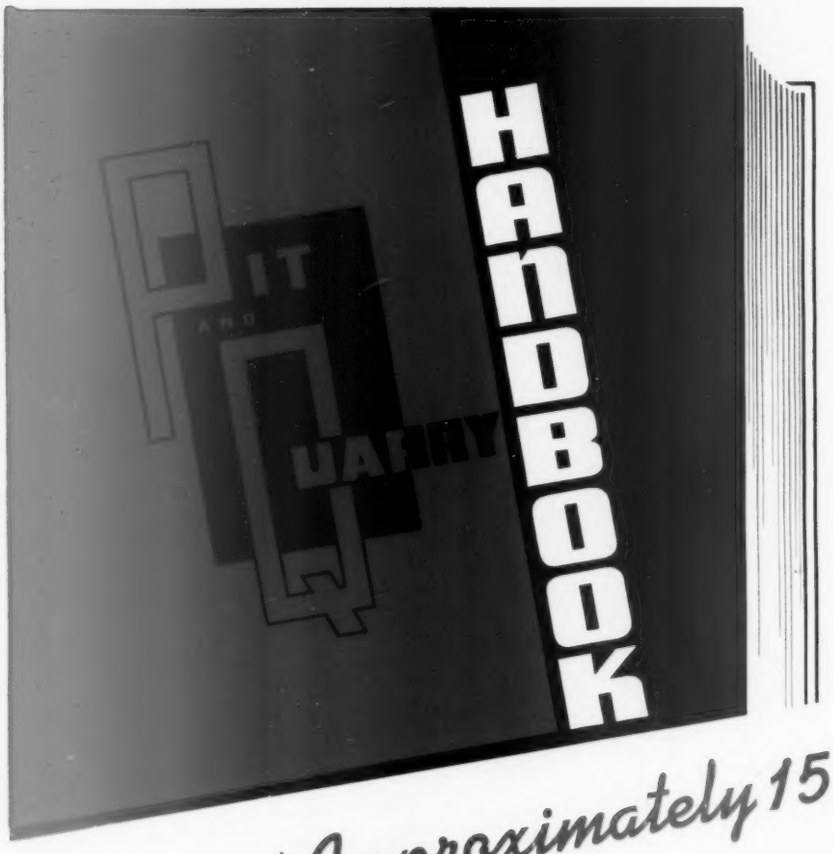
40-6

BARBER GREENE

STANDARDIZED MATERIAL HANDLING MACHINES

AURORA ILLINOIS

HAZARD LAY-SET PREFORMED



- **Complete, accurate and up-to-the-minute Directory.**
- **Hundreds of new names; others checked and revised.**
- **Alphabetical by companies; geographical by plants.**
- **Consolidated catalogs of equipment makers.**
- **Revised and improved technical section.**

Contains Approximately 15,000 Names for Your 1940 Mailing List . . Order It Now!

Don't Waste Your Time and Postage on an Old List

The compilers of the 1940 Directory Section of Pit and Quarry Handbook have labored painstakingly to build an accurate list of all known American producers of nonmetallic minerals. Each new listing has been carefully scrutinized for accuracy and completeness. Previous listings have been revised, checked, double-checked. All appear two ways—(1) alphabetical by companies, (2) geographical by plants. It gives you company names, officers, location of plants, size or capacity, and names of the men who do the buying. Select the complete Handbook and Directory, or the convenient, flexibly-bound Directory alone. Now ready for distribution. Order NOW to insure getting one of the first copies. Use coupon below . . . we'll bill you after you get the book.

Pit and Quarry, Date.....

538 S. Clark St., Chicago, Ill.

Please send.....copies of the 1940 HANDBOOK ($10.00 per copy)

Please send.....copies of the 1940 DIRECTORY ($10.00 per copy)

☐ Check enclosed.....

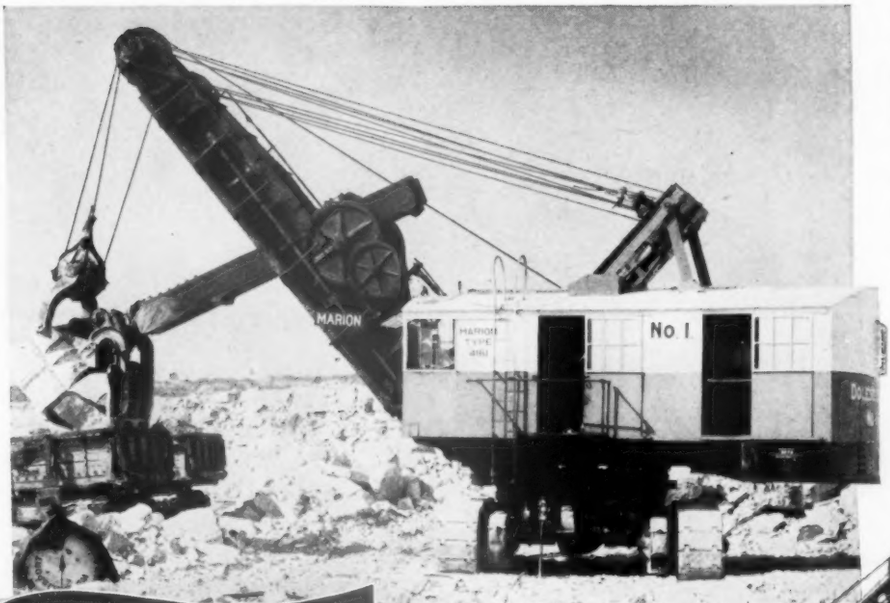
☐ Send Invoice with book

Name ..... Title.....

Company .....

Town ..... State.....

DOLESE and SHEPARD COMPANY
MODERNIZE with MARIONS for SPEED and ECONOMY



The Marion Type 4161 Shovel loads quarry cars in record time

To speed up quarry operations and cut quarrying costs, Dolese and Shepard, McCook, Ill., use these two Marions. The Marion Type 4161 shovel not only increases production, but makes big yardage easy on a box cut formerly difficult to work. The Vacuum Controlled Clutches, operated by one handy lever, are but one of the many features of the Marion Type 352 clamshell that speed up loading and unloading in the storage yard. • May we tell you more about Marion's adaptability to your quarry problems? Write today for catalog.

The MARION STEAM SHOVEL COMPANY, Marion, Ohio, U.S.A.

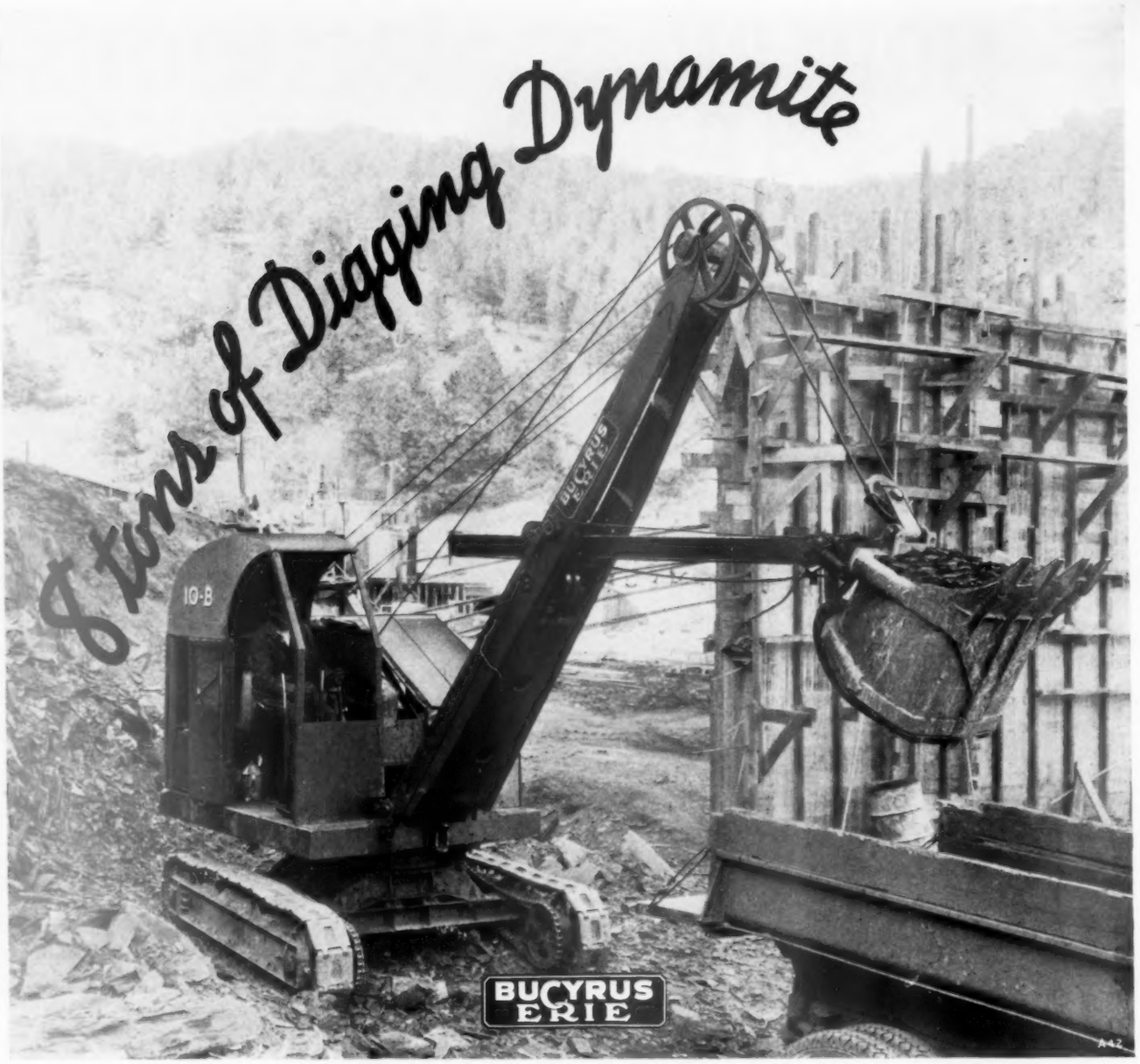
The Marion Type 352 Clamshell readily solves all material handling problems

Modernize with

MARION

SHOVELS • DRAGLINES • CLAMSHELLS
CRANES • PULL-SHOVELS • WALKERS

From 3/4 Cubic Yard to 35 Cubic Yards
Gasoline, Diesel, Electric



The 3/8-yard 10-B weighs only 8 tons but it can outwork many machines twice its size. For stripping, building and maintaining hauling roads, digging drainage ditches, handling clean-up work, or even loading, you will find the 10-B's unmatched digging speed and mobility will save you money all over the mine. Its speed is backed by tough, modern construction that stands up to hard going day in and day out. Write for details on the savings you can make with this bit of "digging dynamite."

Bucyrus · Erie

SOUTH MILWAUKEE, WISCONSIN

WHO SAID "Wire Rope Reeving Isn't Important"?

BEFORE

4" rollers at reverse bend. Rope service unsatisfactory.

AFTER

17" sheaves replaced the 4" rollers.

RESULT **Rope Service almost Doubled!**

This is an *actual* case history. Not an isolated case. But a typical example of what can be and is being done to increase rope life through proper wire rope reeving.

There is nothing complicated about proper wire rope reeving. It's simply a matter of watching the things that are easily overlooked—avoiding reverse bends whenever possible, making sure that sheaves are large enough, that sheave grooves are in proper condition, etc. The additional examples to the right are typical of what can be done. And they pay big in results.

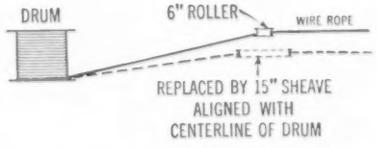
To obtain maximum safety and service from wire rope—watch wire rope reeving. And feel free to consult our local representative—who will gladly make available to you our years of experience with every conceivable kind of reeving problem. His suggestions may point the way to worthwhile savings.

JOHN A. ROEBLING'S SONS CO.
Trenton, N. J. *Branches in Principal Cities*

This advertisement is published in the interest of all wire rope users, to help them obtain greater safety, service and efficiency from their wire rope.

ROEBLING
JAR *Wire Rope*

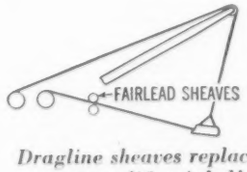
SOME OTHER "REEVING POINTERS" THAT INCREASE ROPE LIFE



These simple changes doubled rope life!

Originally, a 6-inch roller was used, as indicated above, in reeving a hoist. First of all, this roller was too small—causing a sharp bend in the wire rope. Secondly, it was improperly aligned—causing scrubbing action of the rope on the drum. As a result wire rope life suffered.

By simply replacing the 6-inch roller with a 15-inch sheave, and properly aligning this sheave, as shown, excessive rope wear was eliminated. Wire rope life was doubled!

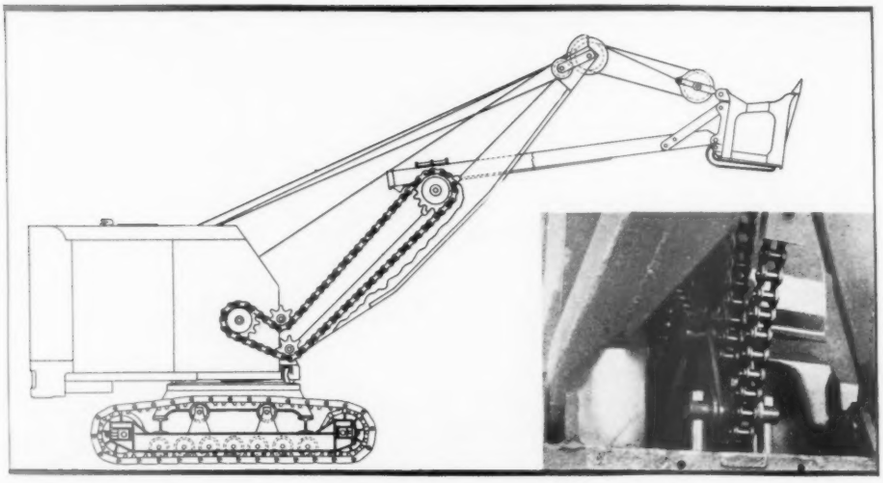


Dragline sheaves replaced —rope life tripled!

An Illinois coal company replaced worn Fairlead sheaves with larger sheaves of harder material. Result—average service of five ropes almost tripled that of five ropes used before.

Ask about **ROEBLING "BLUE CENTER" WIRE ROPE** *... either standard or preformed*

Bigger Performance at Lower Cost



is no idle boast with this

POWERFUL ONE-PIECE CHAIN CROWD

Just as a chain is no stronger than its weakest link—so, too, a shovel is no better than its crowd. We have long prided ourselves on the powerful independent and positive one-piece chain crowd

We review here only one of the many outstanding design advantages which are standard construction in the BAY CITY. Let us send you a copy of our 32-page catalog H-3 that tells the complete story.

BAY CITY SHOVELS, Inc., BAY CITY, MICHIGAN
Export Office, 330 W. 42nd St., New York City (OPARO)

standard on all BAY CITY Shovels from $\frac{3}{8}$ to $1\frac{1}{2}$ yard.

The superiority of this chain crowd, with automatic chain adjustment, is the logical result of equipping the best type of crowd with the best type of chain—*American Standard, finished steel roller chain.* There are no combined stresses in this chain as pull is transmitted through straight-line simple tension in the flat link plates and not through off-set link plates as in rough or unfinished type roller chain. The chain pins are in shear only—the bushings in compression only.

This is the kind of chain you get in the BAY CITY crowd. No wonder maintenance and operating costs are reduced. Users report ten years or more of continuous service without replacement. Add to this the wider working ranges possible with chain crowd and the answer is bigger, lower-cost performance.

BAY CITY

SHOVELS · CRANES · DRAGLINES · TRENCH-HOES · SKIMMERS

PIT AND QUARRY

Vol. 32 JUNE, 1940 No. 12

CONTENTS

News of the Industry 19
Editorial: Who Pays for the Highways? 25
Second 290-Foot Rotary Kiln Installed in Millard Lime Plant in Annville 26
South African Cement Plant Utilizes Raw Materials of Low Lime Content 29
Insulating Rotary Lime Kilns—Part II 32
A Review of Developments in the Nonmetallic-Minerals Industries 33
Constructs Asphalt Plant Under 10-Year Performance Guarantee 35
Performance Measurement and Mechanical Control—Part V 37
Cost Keeping for Superintendents 41
Observe Centennial of Mineral Wool 44
New Florida Crushed-Stone Plant Has Unusual 150,000-Ton Storage System 45
Maine Feldspar Plant Has Doubled Capacity Twice Since Starting 49
Big Market Looms for Burial Vaults 68
Modern Machines, Properly Used, Aid in Keeping Cost of Production Down 69
Concrete Tiles on Concrete Joists Provide Low-Cost Concrete Floors 72
Southern Aggregates Producer Creates Concrete-Brick Market 75

Personal Mention 52
Occupational Diseases and the Law 52
Labor Decisions 55
Foreign Developments 61
Traffic News Digest 63
New Machinery and Supplies 64

Published on the first of each month for producers and manufacturers of Cement, Crushed Stone, Gypsum, Lime, Sand, Gravel and other nonmetallic minerals. Copyrighted 1940 by Complete Service Publishing Co., 538 South Clark Street, Chicago, Ill.

H. W. BAUMGARTNER
President

STANLEY A. PHILLIPS
Vice-President and Directing Editor

Field Editor:
W. E. TRAUFFER

Assistant Editor:
HARRY F. UTLEY

Circulation Manager:
W. T. KLUSSMAN

Advertising Manager:
JAMES E. MONTGOMERY
Telephone HARrison 9357
Chicago, Ill.

Eastern Advertising Manager:
W. A. WILSON
Room 430, 122 East 42nd St.
Telephone CALedonia 5-4438
New York, N. Y.

Central Advertising Manager:
W. H. SANDERSON
Auditorium Bldg.
Telephone CHerry 4432
Cleveland, O.

Advertising Representatives:
D. R. EGBERT
Chicago, Ill.

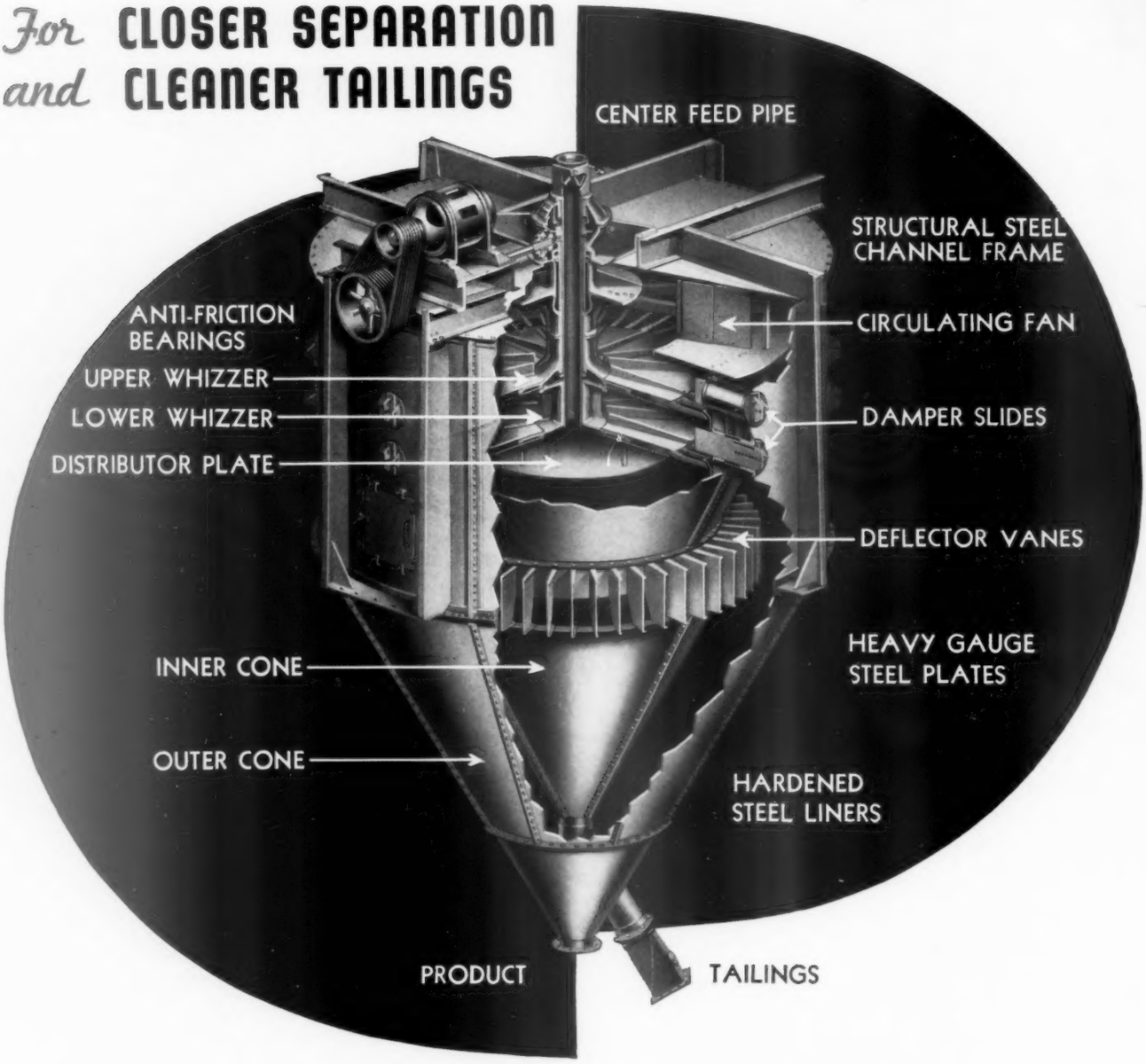
W. H. GRUBBS
Western Pacific Bldg.
Telephone Prospect 3746
Los Angeles, Cal.

DUNCAN A. SCOTT & CO.
Mills Bldg.
Telephone Sutter 1393
San Francisco, Cal.

Field Representatives:
A. C. PETERSEN
J. K. GARESCHE

MEMBER AUDIT BUREAU OF CIRCULATIONS

For CLOSER SEPARATION *and* CLEANER TAILINGS



Raymond DOUBLE WHIZZER Separator

Here is the inside story of the Raymond whizzer-type Mechanical Air Separator . . . and it tells why producers are able to obtain better results from this superior method of classification.

The double whizzer gives still closer control in the selection of particle sizes. It raises the percentage of recovery of the fines . . . increases the uniformity of the product . . . and results in cleaner tailings with a minimum of undersize.

On finished cement, it is easy to meet the most exacting specifications with the double whizzer separator when classifying into various grades, from 1800 to 3300 surface areas, for both standard and high early strength cements.

For the removal of grit in refining clay . . . for classifying fine gypsum plaster . . . for separating sand from silica or other mixtures . . . for separating hydrated lime, and for producing micron materials up to 99.9% through 400-mesh fineness . . . you can get a "clear-cut" separation with the double whizzer unit that is obtainable in no other way.

If you have a difficult separating problem, this double whizzer may be the right answer.

RAYMOND PULVERIZER DIVISION
COMBUSTION ENGINEERING COMPANY, INC.
1321 North Branch Street **CHICAGO**
Sales Offices in Principal Cities • • • In Canada: Combustion Engineering Corporation, Ltd., Montreal

Monarch Workers Strike; Company Offers Rejected

Union employees of the Humboldt, Kansas, plant of the Monarch Cement Company went on strike May 1 and picket lines were reported established early in the month at the plant, with 175 workers involved in the dispute.

The strike, called by William Schoenberg, Chicago, president of the United Cement, Lime and Gypsum Workers, was followed by proposals to the company for (1) increased wages; (2) a closed shop; (3) adoption of the check-off system; and (4) seniority privileges.

Counter proposals submitted by the company were said to have been rejected.

Resumes Work After Quarry Is Dewatered

Closed more than a month after flood waters had filled its quarry at Brodhead, Pennsylvania, the National Portland Cement Company has resumed operations.

It is estimated that nearly 4,000,000 gallons of water were pumped out of the quarry. There was little damage to equipment.

Sand Firms Exhibit at Foundry Show

A number of industrial-sand producers were among the exhibitors at the show held in connection with 44th annual convention of the American Foundrymen's Association at Chicago May 4 to 10, inclusive. They included: Hougland & Hardy, Inc., Evansville, Indiana; Cleveland Quarries Company, Cleveland; Great Lakes Foundry Sand Company, Detroit; Peerless Mineral Products Company, Conneaut, Ohio; George M. Pendergast & Company, Milwaukee; George F. Pettinos, Inc., Philadelphia; Sand Products Corporation, Detroit; Tamms Silica Company, Chicago; Whitehead Brothers Company, New York; and Zanesville Sand Company, Zanesville, Ohio.

Employees Covered If Product Crosses Line

Employees engaged in the production and delivery of ready-mixed concrete are not covered by the Wage and Hour Law unless the product is moved across state lines, according to a recent bulletin issued by V. P. Ahearn, executive secretary of the National Ready Mixed Concrete Association.

The information follows an exchange of correspondence between Mr. Ahearn and the Wage and Hour Division over precedents established in recent rulings by representatives of the U. S. Department of Labor.

Hannibal Men Honored for Safety Record

Celebrating a record of 470 days without a lost-time accident, 75 employees of the Hannibal, Missouri plant of the Marblehead Lime Company were entertained at a banquet at the Mark Twain Hotel, St. Louis, recently by President Bernard L. McNulty of Chicago.

Man Fatally Injured in Gypsum-Mine Cave-in

One man was injured fatally and another had a narrow escape from a similar fate April 30 when part of a shaft 70 feet underground caved in at the Roll Road mine of the National Gypsum Company in Clarence Center.

Fire Razes Wisconsin Producer's Office

Fire caused damage estimated at $1,500 to the recently remodeled two-story office building of the Consumers Crushed Stone Company near Racine, Wisconsin. The fire is said to have started from an overheated stove pipe.

Monolith to Add Kiln; Also Plans Gypsum Plant

Contracts have been awarded by the Monolith Portland Cement Company for the construction of another rotary kiln at its plant near Tehachapi, California. The new kiln will increase the plant's capacity to produce by about 1,500,000 barrels annually.

The Monolith concern also plans the erection of a $100,000 plant to process gypsum and manufacture gypsum products in the near future, according to a statement by Coy Burnett, president. The location of the gypsum operation, other than that it will be in Kern County, California, has not been revealed.

Denies Joint Trial for Alleged Victims

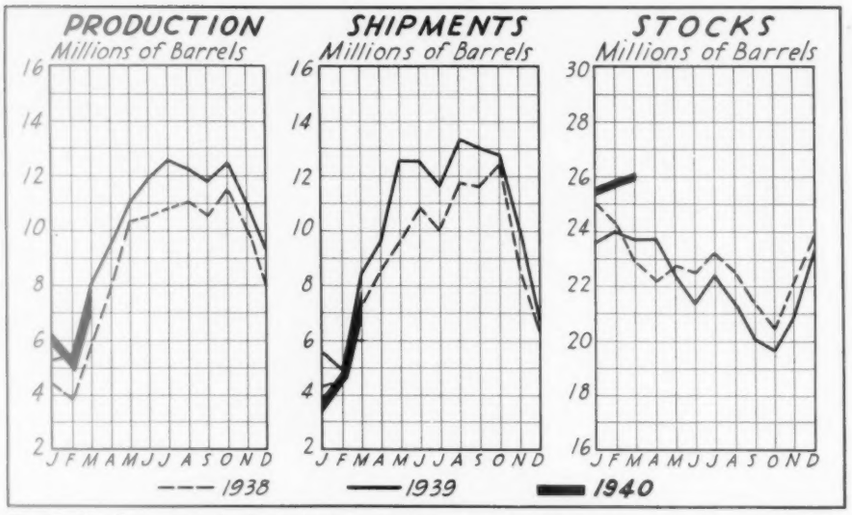
Federal Judge Harold P. Burke denied a motion of the United States Gypsum Company for a joint trial of the damage actions brought by five employees for lung injuries allegedly suffered in the company's mines at Oakfield, New York. The suit is being tried in Rochester.

Judge Burke ruled "that although the work of all the plaintiffs was performed in the same mine . . . the exposure to the source of the alleged harmful dust was different in each case."

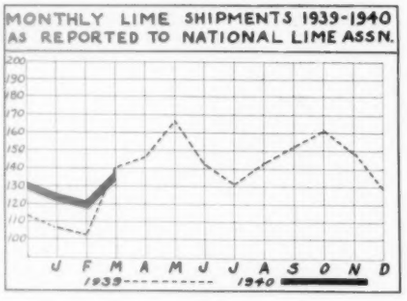
Los Angeles Plant Is Damaged by Blaze

Fire caused about $40,000 damage at Los Angeles recently when it swept the plant of one of the city's prominent concrete-products operators, the Frank X. Enderle Concrete Products Company, on the San Fernando Road.

New machinery which had been installed only a week was destroyed in the blaze. The concern specializes in the manufacture of concrete burial vaults.



The Portland-cement industry in March, 1940, produced 7,917,000 barrels, shipped 7,715,000 barrels from the mills, and had in stock at the end of the month 26,098,000 barrels, according to the Bureau of Mines. Production and shipments in March, 1940, showed decreases of 3.1 and 8.9 per cent., respectively, as compared with March, 1939. Portland cement stocks at mills were 9.7 per cent. higher than a year ago. The statistics are compiled from reports for March received by the Bureau of Mines from all manufacturing plants.



According to data collected by the National Lime Association, 73 companies in March, 1940, shipped 138,015 tons (83,082 quicklime; 54,933 hydrate). Reporting companies represent 51.9 per cent. of the association's total capacity of record. Based on PIT AND QUARRY's estimates for the remainder of the industry the total shipments for the month are estimated to have been approximately 275,000 tons. Shipments of lime by use and grade for March, 1940, were as follows:

Use	Quicklime (tons)	Hydrate (tons)
Agricultural	1,759	12,520
Building	16,985	25,614
Chemical	64,338	16,799
Total	83,082	54,933

Panama Quarry Has Capacity Doubled

Work has been started in Panama on the expansion of the Sosa Hill rock quarry which will practically double the output of the quarry and will furnish crushed rock in gradations for concrete aggregates from dust to two and one-half inches in diameter into bins at the rate of 125 tons an hour.

The work involves the installation of a primary crusher, a secondary modified gyratory rock crusher, five new bins of 1,200 cubic yards capacity, vibrating screens, conveyor belts, and other necessary equipment.

Necessary new equipment is being furnished by the Kennedy-Van Saun Manufacturing & Engineering Corporation of New York and installation of the equipment is being done under the direction of L. C. Heddens, erection engineer of the Kennedy-Van Saun company. The general plant expansion is under the direction of "Mac" Silvert, plant engineer of the Panama Canal, and George Crooks, of the Municipal Division, is general foreman of the work.

Lay Foundations for Third Rotary Kiln

Foundations have been laid for the addition of a third kiln at the new cement plant of the Permanente Corporation at Los Altos, California.

Two more ball-mills are also being installed to increase grinding capacity.

The Janesville Sand & Gravel Company, Janesville, Wisconsin, displayed a variety of sizes of gravel and sand quarried near Janesville with an explanation of how each is used at a hobby show held recently in the Y. M. C. A. at Janesville. The affair was attended by 4,176 persons.

EMPLOYMENT AND PAY-ROLLS

(Compiled for PIT AND QUARRY by Isador Lubin, Commissioner of Labor Statistics, U. S. Dept. of Labor.)

Industry	Establishments	Number of Employees	Pay Rolls (1 week)
Cement:			
February, 1940	136	16,759	$412,461
March, 1940	136	17,970	463,878
Percentage change		+7.2	+12.5
Quarrying and non-metallic mining:			
February, 1940	1,095	30,065	601,401
March, 1940	1,095	32,221	665,898
Percentage change		+7.2	+10.7

House Building at High Point Since Autumn of 1929

Residential contracts awarded in April in the 37 states east of the Rocky Mountains were the highest since October, 1929, according to the F. W. Dodge Corporation. This April volume, amounting to $135,420,000, exceeded the total recorded for April, 1939 by 18 per cent. Awards for both apartments and one-family dwellings showed substantial gains.

In terms of better housing conditions, the increase in dwelling units was also striking: whereas the $114,405,000 total reported for residential construction in April, 1939 afforded 22,122 dwelling units, last month's total of $135,420 000 provided 27,418 units—a 24-per cent. increase.

Private-ownership residential construction, as differentiated from publicly-financed projects, amounted to $119,706,000 or 88 per cent. of the April total. This volume for private residential construction is the highest since this separate record was begun in 1932 by the Dodge organization.

In the non-residential classification, commercial and manufacturing building the best barometers in the construction field of general business sentiment, continued to show major increases over the corresponding month of last year. Commercial building was up 13 per cent; manufacturing building, 35 per cent.

Although the total volume of contracts awarded in April fell 9 per cent. short of the volume for the corresponding month last year, the total awards for private ownership construction were 16 per cent. ahead. Public construction contracts, on the other hand, lagged 35 per cent. behind April, 1939.

Johanson Transferred to Seattle Office

Gordon N. Scott, president of the Pioneer Sand & Gravel Company, Inc., Seattle, has announced the transfer of Nels E. Johanson from the firm's Tacoma subsidiary, The George Scofield Company, to headquarters in Seattle, effective April 1.

Mr. Johanson, president of the Rotary Club of Tacoma, director of the Tacoma Chamber of Commerce and past president of the Tacoma Elks Club, is to serve in the capacity of vice-president of Pioneer and as President Scott's assistant.

The sand-and-gravel plant operated by Sam McVey, at Newberg, Oregon, has been damaged by fire about $2,500.

Missouri Minerals Conference Holds Annual Gathering

Roy E. Mayes, president of the Carthage Marble Company, was elected chairman of the Missouri Mineral Industries Conference at the second meeting of this organization held on the campus of the School of Mines and Metallurgy at Rolla, Missouri, on April 26 and 27. Mr. Mayes was the principal speaker at the dinner Friday evening, April 26, given by the conference and the St. Louis Section and the Tri-State Section of the American Institute of Mining and Metallurgical Engineers. His subject was *To-day's Challenge*.

The Mineral Industries Conference, according to Dr. H. A. Buehler, head of the Missouri Geological Survey, was organized for the purpose of gaining a better knowledge of the possible services that can be rendered by the Missouri Geological Survey, the Missouri School of Mines and the United States Bureau of Mines to the industries that these institutions are organized to serve and that these institutions and the industries may be drawn into closer contact with the problems which the institutions are maintained to help. Nine technical papers were read at the conference dealing with the various phases of Missouri's Mineral Industries.

Other officers elected include A. E. Stocking of De Soto, Missouri, as vice-chairman; W. M. Weigel of St. Louis, secretary-treasurer; and the following members of the board of directors: C. M. Butler (Cape Girardeau), E. G. Doane (Poplar Bluff), G. C. Smith (St. Louis), E. H. Lewis (Webster Groves), C. W. S. Sammelman (St. Louis), Arnold Griffiths (Jefferson City), T. Inkley (Ste. Genevieve), P. A. Haines (Rivermines), Ralph Smith (Ste. Genevieve), and George Fowler (Joplin).

Indiana Producer Adds Considerable Equipment

A new storage system, new skip cars and hoisting equipment have been placed in service at the Ridgeville, Indiana, crushed-stone plant of the Mid-West Rock Products Corporation. In addition to commercial and agricultural stone the plant sells a large output of limestone dust to glass manufacturers. The entire plant was electrified last year.

Headquarters of the company are in Indianapolis. Plants are operated also at Greencastle and Spencer, Indiana.

Roy E. Mayes, newly-elected president of the Missouri Mineral Industries Conference, speaking at the banquet.

Pick Cincinnati for Ready-Mixed Convention

The 1941 convention of the National Ready Mixed Concrete Association will be held at the Netherland Plaza Hotel Cincinnati, January 15 to 17 next year. On the preceding day, January 14, the board will hold its regular annual meeting. This was decided on at the mid-year meeting of the board held in Chicago on May 16.

Executive Secretary Ahearn read the names of more than half a dozen new member companies, one of whom, the Zenith Dredge Company, Duluth, had a representative present. An honorary membership, the association's first, was given by a unanimous vote to R. B. Young, chief engineer of the Ontario Ready Mix Concrete Company, Ltd., of Toronto, Canada, in recognition of his many years of active work for the advancement of the ready-mixed-concrete industry. It was decided to investigate a proposal to provide all members with decalcomania-transfer and other types of reproductions of the association's emblem for use on its members' trucks.

It was reported that the movement for the establishment of a truck-mixer bureau among the manufacturers of ready-mixed-concrete trucks was making progress. A meeting of the organizers is scheduled to be held early in June.

There was some discussion of the adoption of definitions of the terms "ready-mixed concrete," "central-mixed concrete," "shrink-mixed concrete," "transit-mixed concrete," and "truck-mixed concrete." The last-named term is used in some specifications to indicate concrete mixed in a truck-mixer after its arrival at the job as distinguished from concrete so mixed on the way to the job. A committee was appointed to study the matter and report.

As usual the labor question provoked an interesting discussion in the course of which some of the anomalies of the present situation were mentioned. The rule of time and one-half and double-time pay for Saturday-afternoon, Sunday and holiday work by hoisting engineers and truck drivers in an industry which can not level out the "peaks" and "valleys" in the demand curve of its product is imposing great hardships on operators.[1]

The following board members, association members and guests were in attendance:

V. P. Ahearn, *executive secretary*, Washington, D. C.

Barney Devine, Chain Belt Co., Milwaukee, Wis.

J. H. Dixey, *president*, Transit Mix Concrete Co., Inc., New York, N. Y.

T. H. Fleming, Concrete Transport Mixer Co., St. Louis, Mo.

Alexander Foster, Jr., Warner Co., Philadelphia, Pa.

Alexander Johnson, Central Concrete, Inc., Brooklyn, N. Y.

James F. McCracken, American Builders' Supply Co., Louisville, Ky.

A. J. O'Connor, Koenig Coal & Supply Co., Detroit, Mich.

Stanley A. Phillips, PIT AND QUARRY, Chicago, Ill.

N. C. Rockwood, *Rock Products*, Chicago, Ill.

John Price, Stewart Sand & Material Co., Kansas City, Mo.

H. F. Thomson, General Material Co., St. Louis, Mo.

Stephen Stepanian, Arrow Sand & Gravel Co., Columbus, O.

Kenneth Vial, Chain Belt Co., Milwaukee, Wis.

Stanton Walker, *director of engineering*, Washington, D. C.

Fred G. Wood, Zenith Dredge Co., Duluth, Minn.

[1] [In one case known to PIT AND QUARRY more than half of one company's truck drivers were paid more than $3,500 each last year. In another case a hoisting engineer was paid more than $14,000 last year, and for five years has been paid, on the average, over $10,000 annually. Unavoidable overtime work at rates from 50 to 100 per cent, above the regular scale made these high earnings possible.—ED.]

Turner Honored by PCA for 25 Years Service

For the last quarter of a century, every purchase order of the Portland Cement Association has passed through the hands of Harry B. Turner, purchasing agent, with the exception of one made a short time ago.

Harry B. Turner.

That exception was for a fine silver coffee service which was presented to Mr. Turner by the association on Monday, April 22, in appreciation of his 25 years of continuous service. On that date, Mr. Turner was "called away" from the office for a short while. Upon his return he found his department overflowing with about 150 members of the headquarters staff at Chicago. Frank T. Sheets, president of the association, made the presentation.

Back in 1915 Mr. Turner, a Philadelphia resident, started to work for the Portland Cement Association, a small organization which had its headquarters in that city. Since then the association has grown from a handful of men and one district office to a large organization with a combined staff of nearly 500 in the Chicago headquarters and in district and regional offices in the larger cities from coast to coast. After moving to Chicago, general offices were rented in the Conway Building for a number of years and, in 1926, the staff moved into the association's new all-concrete, five-story structure at Grand Avenue and Dearborn Street.

Watchman Wins Back Pay by Court Ruling

Awarding a judgment for $1752.30 and costs, and attorney's fees of $250, the District Court of the United States for the Western District of Tennessee made its decision in favor of the plaintiff in the case of W. W. Wood *v.* Central Sand & Gravel Company and Fischer Lime & Cement Company.

Wood, a night watchman, was employed at the plant of the Central Sand & Gravel Company, a subsidiary of the Fischer Lime & Cement Company, for 13½ hours per day, from 5:30 p. m. until 7:00 a. m., seven days a week, receiving as compensation $14 per week. If subject to the provisions of the Fair Labor Standards Act he was employed 50½ hours of overtime each week, which, on the basis of the minimum wage scale provided in that act, would have raised his average weekly pay to $29.93.

The defendants made three claims in their defense: (1) that the amount of their interstate shipments was insignificant compared to their total business; (2) that in his work as night watchman the plaintiff was not engaged in interstate commerce; and (3) that the plaintiff was exempt under Section 13 (a) (2) of the act because he was allegedly engaged in a retail or servicing business.

(1) With respect to the first defense the court held, on the basis of United States Supreme Court decisions in the cases of *Santa Cruz Fruit Packing Company v. National Labor Relations Board, National Labor Relations Board v. Fainblatt, and Hanley v. Kansas City Southern Railway Company,* that it is immaterial how large or how small a share of a company's products is shipped interstate, that the determining factor is whether any of it is so shipped.

(2) With respect to the second claim, the court decided on the basis of a United States Supreme Court decision in the case of the *Southern Pacific Company v. Industrial Accident Commission,* that an employee falls within the provisions of the act if he was engaged in work "so closely connected with interstate transportation as practically to be a part of it." Inasmuch as the plaintiff's duties included the maintenance of steam pressure in a boiler during his watching hours, the court held that he was engaged in work of that kind.

(3) With respect to the third contention, the court held, on the basis of the decision in *Mason Lumber Company v. Lee,* that the defendants were not engaged in a retail or service business, and that, therefore, they were not exempt from the provisions of the act. The court cited Interpretive Bulletin No. 6 of the Wage and Hour Division of the Department of Labor, in which a retail establishment is defined as one which "sells merchandise to the ultimate consumer for direct consumption, and not for purposes of re-sale in any form." Subsequently the Department of Labor amplified this definition to read, "A retail establishment generally sells its merchandise in small quantities and at prices higher than the price involved in sales to wholesalers or jobbers. Thus, for example, it would seem that a coal company engaged in selling large orders of coal at a discount from the regular retail price would not be a retail establishment under Section 13 (a) (2), notwithstanding the fact that the coal is purchased for direct consumption and not for purposes of resale in any form."

Lime Operators in Chicago for 22nd Convention

As this issue of Pit and Quarry prepares to go to press the National Lime Association is holding its twenty-second annual convention at the Drake Hotel in Chicago. The three-day session opened on Tuesday, May 21, with a luncheon at which the guest speaker was Clarence Randall, vice-president of the Inland Steel Company. The convention formally convened in the afternoon, the speakers being William F. Dinnen, attorney for the Federal Trade Commission, who discussed the workings of the commission; Professor James R. Withrow of Ohio State University who discussed the part the lime industry might play in the development of the new chemical textile fibers; and Sherman D. Lesesne of Oklahoma City University, whose topic was *Road Stabilizing Materials and Processes.*

One of the highlights of the second day's sessions was the talk by S. B. Kanowitz of the Raymond Pulverizer Division of the Combustion Engineering Company, who gave an enlightening address on the use of pulverized coal for calcining limestone. Other speakers on the second day included Dr. Charles Copeland Smith of the National Association of Manufacturers, D. L. Nicolson, application engineer for the General Electric Company, and Dr. R. W. Stone, professor of industrial relations, University of Chicago. Professor G. L. Clark of the University of Illinois, also read a technical paper of considerable interest entitled, *X-Ray Studies of Lime with Practical Conclusions.*

The annual banquet was held on the evening of May 22.

The third and final day's sessions opened with a showing of the color motion picture, "Green Acres," produced by the National Fertilizer Association, in which lime is portrayed as playing an important part in good agricultural practice. Professor Walter C. Voss, of Massachusetts Institute of Technology, described further tests on the use of lime and concrete; and his colleague, Professor Howard A. Staley, discussed *Masonry and Mortar Characteristics.*

A complete report covering the convention will appear in the July issue of Pit and Quarry.

An elevator for unloading bulk cement is being installed at the plant of the Middletown Sand & Gravel Company, Middletown, Ohio.

ASTM Meeting to Consist of 22 Group Sessions

In order to provide ample time for the presentation and discussion of the large number of technical papers and reports to be presented at the 1940 annual meeting of the American Society for Testing Materials to be held at Chalfonte-Haddon Hall, Atlantic City, N. J., June 24 to 28, 22 separate sessions are being arranged, with several symposiums and certain groups of technical papers indicating a strong technical program of widespread interest.

Two sessions will be devoted to the subjects of cement, lime, gypsum and concrete. In addition to the interesting report of Committee C-1 on Cement which this year will include recommendations on entirely new specifications covering five types of cement, there are papers covering testing mortar consistency, discussion of size analysis of cement, discussion on properties of mortars in masonry and tests of over 100 cements for sulphate resistance. The session will also include committee reports on lime and gypsum.

A separate session on concrete includes the report of C-9 on Concrete and Concrete Aggregates and what appear to be a number of interesting papers on the following subjects: Measuring changes in physical properties of concrete materials by the dynamic method, method of measuring thermal diffusivity and conductivity of stone and concrete, significance of the flexure test in designing concrete mixtures for pavements, theory of concrete creep, soundness of chert as measured by apparent specific gravity and absorption, and autogenous volume changes of concrete.

Study Lime Treatment for Industrial Waste

On February 1 a research investigation at Rutgers University on the use of lime in the treatment of sewage and industrial wastes was started. This program is sponsored by the National Lime Association and is under the direct supervision of Dr. Willem Rudolfs. The actual work is being done by Gordon B. Nickol, a recent graduate of Pennsylvania State College.

Commercial samples of the various types of chemical quicklime and hydrated lime have been provided for the investigation. Among the first problems to be studied will be one to determine the effect of the various limes when used as flocculating agents with different kinds of sewage. The objective of the research is to learn more about the use of lime in all phases of sewage treatment and particularly the reasons why lime performs certain functions. Very little information of this nature is available at the present time.

Kansas City Firm in Ready-Mixed Business

With the virtual monopoly on the ready-mix business in Kansas City broken following the imprisonment of its political czar, T. J. Prendergast, who owned the Ready Mixed Concrete Company, the Stewart Sand & Material Company of Kansas City has gone into the ready-mixed-concrete business with an investment of approximately $100,000, including a fleet of 10 truck-mixers.

John Prince heads the concern, which has long been in the aggregates business. It operates two sand-and-gravel plants and one crushed-stone plant.

Resume Production at Illinois Quarry

Production has been resumed by the Keller Quarry Company at Jerseyville, Illinois. Considerable new equipment is to be installed, including a new crusher and loader.

At present much of the output is being utilized by the W.P.A. in connection with the erection of a sewage-disposal plant at Grafton, Illinois.

Visit Buffalo Plants During Convention

While attending their 32nd semi-annual convention in Buffalo, members of the American Institute of Chemical Engineers paid a visit to the Great Lakes Portland Cement Company plant and the Kelley Island Lime & Transport Company plant where they were conducted on tours of inspection.

Chicago Takes First Bids on Ready-Mix

In an attempt to break the ban on ready-mixed concrete in Chicago, the city on May 17 received bids for considerable yardage of the pre-mixed material for placement on various street projects. The Material Service Corporation and Construction Aggregates Corporation were the only bidders.

Union pressure heretofore has balked all efforts to produce and sell the material commercially in the country's second largest city. The Federal government recently launched an inquiry into conditions which have prevented its use.

Cement Contracts for Friant Dam to Three Firms

Cement for the Friant Dam of the Central Valley Project in California will be supplied by the Calaveras Cement Company, the Pacific Portland Cement Company, and the Yosemite Portland Cement Company.

The 1,650,000-barrel award was divided by the Bureau of Reclamation as follows: Calaveras, 800,000 barrels; Pacific 503,000 barrels; Yosemite, 347,000 barrels.

The prices were not announced but it was learned that the successful bidders' figures were "very low—well under a dollar a barrel."

Gypsum Output Up in First Quarter

Increased consumption of gypsum products during the January-March period of 1940 over that in the like period of 1939 is indicated by the gains in sales volumes reported by the producers for all major groups of products in the Bureau of Mines classification. The resulting increase in overall activity in the industry is measured best by the 8 per cent. gains in the tonnages of calcined gypsum and domestic crude produced.

Slightly higher sales of uncalcined gypsum for Portland-cement retarder and agricultural gypsum were more than sufficient to balance the marked decline in sales for miscellaneous uses so that the total indicated consumption of raw gypsum in the first quarter of 1940 topped that of the similar 1939 period by 5,586 short tons. Total industrial consumption of calcined gypsum exceeded that of the first quarter of 1939 by 14 per cent. as a result of increased sales in all classifications under this group of products.

Imports of crude gypsum during the first quarter of 1940 were more than three times larger than in the same period of 1939 and represented an unusually large volume for the winter months. Since the outbreak of the European war last September, it is apparent that crude stocks at calcining plants along the Atlantic Coast have been greatly enlarged as a precaution against possible interruption of ocean shipments.

Fire destroyed several buildings, a motor truck and some machinery early on the morning of May 4 at the plant of the Tecumseh Gravel Company, Tecumseh, Michigan.

CURRENT BUSINESS INDICATORS

All doubt regarding actuality of the war in Europe was forcibly allayed by the middle of May. The outcome, however was not as readily apparent for Germany's lightning thrusts quickly developed advantages pointing toward an early rout. The Allies, on the other hand, appeared confident of slowing Germany's mechanized advance. If they succeed in forcing the conflict into a long drawn-out stalemate an Allied victory seems assured, for Germany's supplies of oil and other war materials are definitely limited, and the countries she has subdued thus far contain nothing of consequence to aid the situation.

In this country interest in the war reached a climax with the President's stirring message to the Congress stressing the need for adequate national defense measures. The billion-dollar program recommended by the President is expected to have a definitely stimulating effect on industry. Many phases of the program may take several months to get under way but a number of activities will be started immediately after the money becomes available. Increased output of airplanes, motors, parachutes, tanks, guns, ships, ammunition, and lesser items of importance in national defense is to begin at once. Part of this set-up in production can be effected through the use of multiple shifts in existing plants, but much new construction in the form of additional factories or expansion of present plants will be forthcoming. The building-materials industries definitely will be benefited by this construction. Outlets for cement and aggregates in new defense fortifications are as yet unknown.

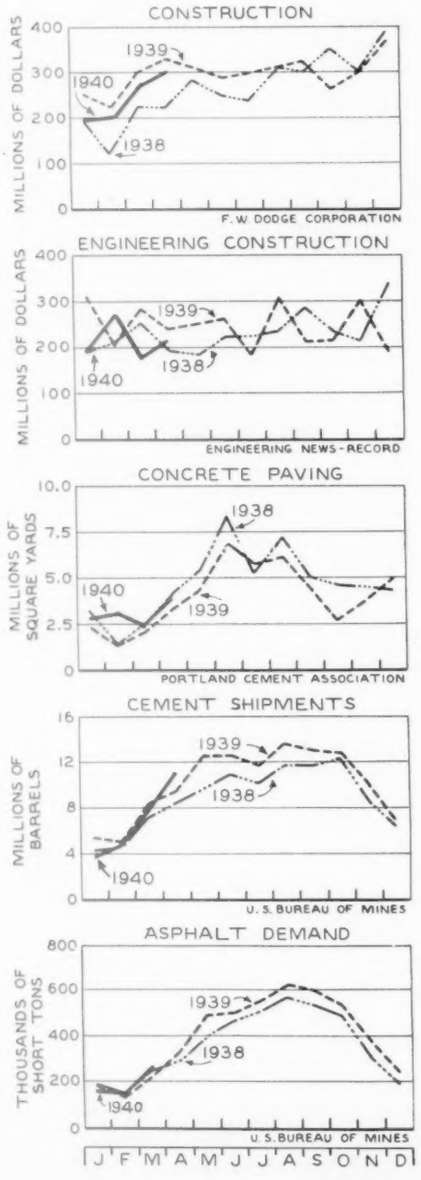
Even before the announcement of additional huge expenditures for national defense, business was recovering from the slump that set in at the turn of the year. Industrial production, as measured by the index of the Federal Reserve Board, had declined steadily from the record peak of 128 in December to 102 in April, but a moderate upturn in May is confidently expected. A year ago the index was 92.

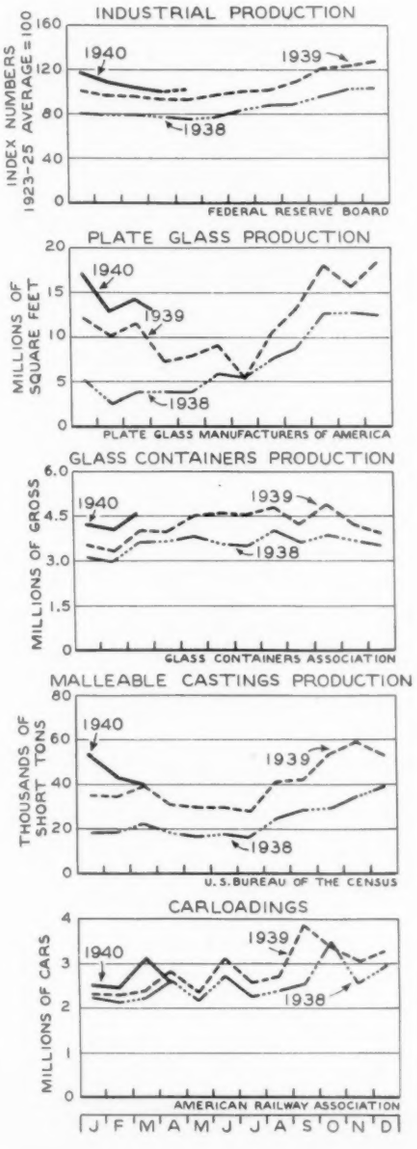
The value of construction contracts awarded continued to increase in April, according to figures of the F. W. Dodge Corporation. The total for the first four months of 1940, however, is 12 per cent. below the comparable period last year. Private nonresidential building in particular has been active, about a third more than in 1939 and near the peak level reached in mid-1937. Residential building is also somewhat above last year but public construction has slumped drastically.

Shipments of Portland cement in April were considerably higher in 1940 than in 1939 but the total quantity shipped to date is about 5 per cent. lower than a year ago. The immediate outlook for cement and aggregates in paving, however, is fairly good for contracts for concrete paving are running more than 20 per cent. ahead of last year. Asphalt demand also is a little higher. Engineering construction contracts are lower than in 1939.

Plate-glass production is highly susceptible to fluctuations in automobile output. So far in 1940 production is well ahead of either 1939 or 1938. As glass containers production is also higher this year it would seem that the glass-sand producers are having a relatively busy time, if volume of output is an accurate criterion.

Despite the continued pressure of the Allies to purchase planes and other supplies and equipment from the United States, exports, which have been at a high level since last December, declined somewhat in April. A large part of this decrease was accounted for by the complete cessation of shipments to northern European countries after the outbreak of hostilities there, but declines were also reported in shipments to most other countries. Exports to Canada, Union of South Africa, and France, however, increased.





EDITORIAL

Who Pays for the Highways?

FOR years the public has been encouraged to believe that those who use our highways, whether for personal advantage and convenience or for profit in the capacity of public carriers of passengers and freight, have not paid enough in taxes and license fees to build, or even to maintain, them. Until the motor vehicle, with the aid of better highways, had become a serious competitor of the railways, to the extent of diverting part of their passenger and freight revenues to the pockets of motor carriers and by demonstrating the conveniences of motor travel as compared with railway travel, little was heard of the question "Who pays for the highways?"

Prior to that time the same lack of foresight, which had made it impossible for the railways to foresee the profits that they could derive and the insurance they could provide for at least a part of their capital investment through operation of motor-carrier vehicles themselves, prevented them from believing in the possibility of anyone else operating motor carriers on a profit-making basis. Their utter lack of interest in the motor vehicle, except as a source of freight revenue, fell in some quarters only a little short of sneering contempt.

When it was discovered that intercity highway transport had, in the language of the man in the street, "come to stay," publicity men and propaganda specialists acquired new clients, and the anti-motor, anti-highway attitude of the railways was given nation-wide circulation. The users of the highways, whether private or corporate and whether motivated by the desire for pleasure or the search for profit, were portrayed as special and favored beneficiaries of public subsidy. They were pictured as traveling over facilities provided at public expense and failing to pay even a reasonable, to say nothing of their fair, share of the cost of providing and maintaining those facilities. The extent and the nature of the propaganda reflected quite accurately the temper of those who paid for it; they expressed the irritation, the discouragement, of a group that, as the "backbone of the nation," had considered its position impregnable. It was the cry of anguish of those who have been out-thought and out-manœuvered.

For many years this subject has remained in the realm of ignorance, wherein claims and counter claims assailed willing readers and listeners. Since the owners of motor vehicles were in the majority and increasing from year to year, they were hard to convince. They have never, as a class, been convinced that they were occupying an unsound financial position or that they were the "pets of government," as one irate official described them. They have borne a continually rising burden of expense, which, it was believed, was at least keeping pace with, and possibly even exceeding, the growing cost of highway construction and maintenance. Anti-highway propaganda reached what was, as far as we can recall, its zenith something more than a year ago, when there issued from the offices of the Association of American Railroads an impressive-looking booklet entitled *Highway Costs; a Study of Highway Costs and Motor Vehicle Payments in the United States,* written by two men with impressive-looking titles, one a professor of railroad and highway transportation, the other a professor of railroad and highway engineering.

In striking contrast to this and the other types of propaganda directed toward the reduction of highway transportation, or to the increase of its costs, there has just appeared a four-volume report, *Public Aids to Transportation,* issued by Joseph B. Eastman, chairman of the Interstate Commerce Commission, who as Federal Coördinator of Transportation, initiated the investigation, which, after six years' continuous work, carried on since 1936 by Dr. Charles S. Morgan, is now available for study. For the first time we have a factual examination of the question as it affects not only highway transportation but railroad transportation and waterway transportation. The report takes its place as a monumental analysis of a situation that was badly in need of study and clarification.

In its net result, so far as the highway-transportation section of the problem is concerned, the report states in the summary of Volume IV, *Public Aids to Motor Vehicle Transportation; an Analysis of Highway and Street Costs and Motor-Vehicle User Payments,* that "motor-vehicle user payments, consisting of state gasoline and registration fees, miscellaneous state taxes and estimated municipal and county and local motor-vehicle taxes," excluding Federal excise taxes on gasoline and vehicles and accessories because of their use for the support of the general functions of government, amounted to $6,132,933,000 in the 1921-1932 period and to $4,751,773,000 in the 1933-1937 period, or, respectively, "$138,172,000 and $387,966,000 more than the assigned costs." No detailed review of the report's data can be given in the space available here, but it may be said that Dr. Morgan found that "passenger cars slightly more than discharged their responsibilities for road and street costs," that "all buses, except school buses, met their responsibilities," that "users of farm trucks fell 14 per cent. below the assigned costs," and that "trucks larger than 1½ tons rated capacity generally discharged their obligations; in some cases payments considerably exceeded assigned costs." The data from which these conclusions are drawn appear to have been carefully collected and fairly handled; Dr. Morgan has disclosed no evidence of partiality or prejudgment in the selection or compilation of his facts; his conclusions appear to have been inescapably arrived at. He has rendered a distinct service to the operators of the railroads and to the users of highways and waterways as well as to those who, like ourselves, are not "parties in interest." Nevertheless, it is not to be expected that the railroads will accept Dr. Morgan's findings as fair, since they effectively refute the position that the railroads have for years maintained.

In his foreword to the report Mr. Eastman said that in his opinion the theory of the railroads that highway users, especially the trucks and buses with which they compete, should bear a greater share of highway costs is "patently unsound." "The railroads," he said, "have had the opportunity to express to me, both orally and in writing, their views on the highway carriers. Their contentions impress me as being carried to extreme limits."

Second 290-Ft. Rotary Kiln Installed in Millard Lime Plant at Anneville

A panoramic view of the Annville plant taken from the quarry side.

By W. E. TRAUFFER

WHEN the rotary-kiln lime plant of H. E. Millard near Annville, Pennsylvania, went into operation in May, 1937 it was unquestionably the last word in this type of operation. This plant incorporated types of equipment and operating methods formerly used only in cement manufacture, including a 290-foot rotary kiln. Both the kiln and the plant proved themselves and the demand for their products increased to such an extent that in August, 1939 a second 290-foot kiln was ordered. This went into operation in April, 1940 and has proved equally satisfactory.

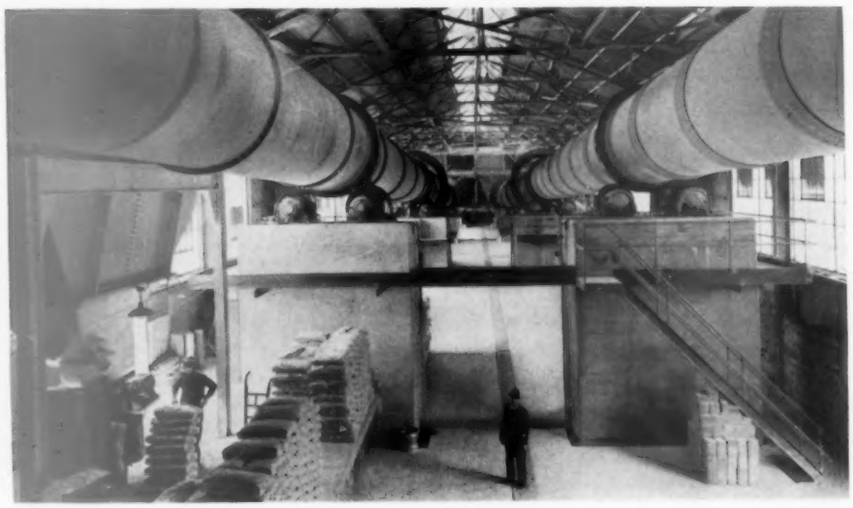
Since a complete description of this plant was published in the August, 1937 issue of PIT AND QUARRY few changes have been made in the design or the equipment. The growing demand has made it necessary to operate this plant and kiln continuously with only a few short stops for maintenance and repairs. Early in the summer of 1939 it became evident that a second kiln was needed and preliminary steps were taken to provide for its installation. Both kilns are of F. L. Smidth & Company manufacture. The F. L. Smidth Atox mill was transferred from the pebble-lime department and put in position for the proposed kiln. Temporarily this mill was connected to the original kiln as a stand-by so that when the new kiln was installed the coal mill was ready to go. To adapt this mill for coal grinding it was only necessary to remove the separator and make a few other minor changes. Everything possible was done before the kiln's erection in order to get it in operation as quickly as possible. The control board and all the electrical connections were made by the company's forces. All the steel work, feed bins, piping, air ducts, feed pipes, building extensions, etc., were fabricated locally to the company's own design. The kiln feeder, seal rings, reciprocating conveyor, skip-bucket, etc., for this kiln were made in Mr. Millard's shops. Largely as a result of these advance preparations no difficulty was experienced in getting the new kiln in quick and satisfactory operation.

The screw-conveyor system which feeds limestone from bins to pulverizer.

The usual difficulties encountered in erecting a kiln inside a building were obviated by the complete equipment available for this work. As in the original plant, General Electric motors and Falk speed-reducers are used.

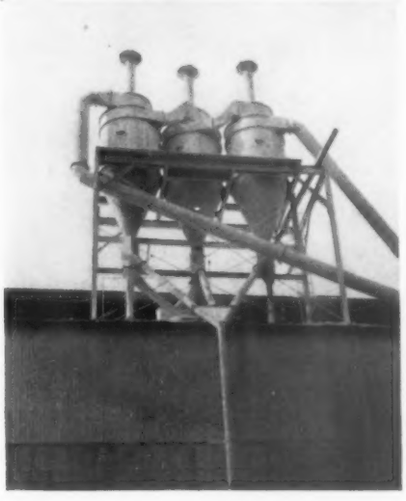
To take care of the additional stone required a Marion No. 37 electric shovel with a 1½-cubic yard dipper was added. Quarry No. 2, which had been abandoned for years, is being reopened to supplement Quarry No. 4. The longer haul required extra equipment and two 14-ton Whitcomb gasoline locomotives were purchased. A 600-foot tunnel is now being driven through from Quarry No. 2 to Quarry No. 1, which had not been operated for several years, and this high-grade stone will be available early in 1941. The 2-ton skip-buckets, which bring stone to the crushing plants, have been enlarged to 3-ton capacity. Their hoisting speed has been increased from 200 to 400 feet per minute. No changes have been made in the two crushed-stone plants since they were described in the previous article.

In this expansion program the conveyor from the dry crushing plant, the two main 2,000-ton stone-storage silos and the stone skip-hoist have not been



Looking toward the firing ends with the new welded kiln at left. In the foreground Mr. Millard is standing in front of the pulverized-limestone packer.

changed. The second belt-conveyor, which formerly fed direct into the single 300-ton steel kiln-feed bin, has been inclined and extended to feed a 4- by 10-foot Kennedy Van Saun 3-deck vibrating screen which has been installed over this bin. Under this screen is a 4- by 8-foot Stephens-Adamson vibrating screen which does the finer sizing. A partition was put in this bin and a second 300-ton 2-compartment feed bin was built for the second kiln. Two 20-inch by 18-foot cross shuttle belt-conveyors carry any sizes of stone



These three 5-foot cyclones in series make three separate products from the mill output.

to the new bin. When necessary, any excess of any of the four sizes of kiln stone can be withdrawn through gates into trucks for stock-piling. Any of the various sizes of stone produced can also be carried by a series of two automatic screw-conveyors to the new limestone-pulverizing or "Air Float" plant.

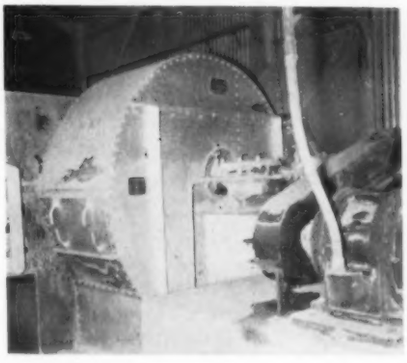
Stone is fed to the new kiln from either of the two bin compartments by a table-feeder similar in design to the feeder on the No. 1 kiln. The new kiln is also similarly equipped with a louvre damper, a Buffalo No. 24 Type F.L.S. draft fan, a variable-speed drive synchronized with the feeder drive, and a White gasoline engine supplies the stand-by power. The new kiln is similar in general design to the No. 1 kiln

The plant as viewed from the new tunnel which connects No. 1 and No. 2 quarries.

in that it is 290 feet in length and is 6 feet 8 inches in outside diameter with an 8 foot 2-inch burning zone. Unlike the other kiln, which is of riveted construction, it is all-welded and there are certain differences in its interior design. It is also lined throughout with Harbison-Walker brick and Johns-Manville Superex insulation and cement are used in the preheating section. The Harbison-Walker 70-per cent. alumina bricks used in the burning zone have had a life of as long as 20 months. The ten single-row Smidth Unax coolers on this kiln are similar to those on the No. 1, but are larger. Instead of being 30 inches in diameter and 10 feet long they are 36 inches by 12 feet. Like the others, they carry the burned lime counter to the kiln flow and are lined with chains for efficient heat transfer.

The No. 1 kiln has developed a capacity of from 150 to 160 tons of lime in 24 hours with a fuel ratio of from 4.5 to 1. West Virginia coal with a 14,600-B.t.u. rating and 4-per cent. ash content is used. This high-grade coal has been found the most economical. This kiln is being operated with an exit-gas temperature of 700 degrees F.

Since the previous article was published a pan-conveyor was installed under the discharge end of the original cooler so that unevenly burned lime produced when starting up the kiln, for example, could be diverted from the regular plant flow. This conveyor has

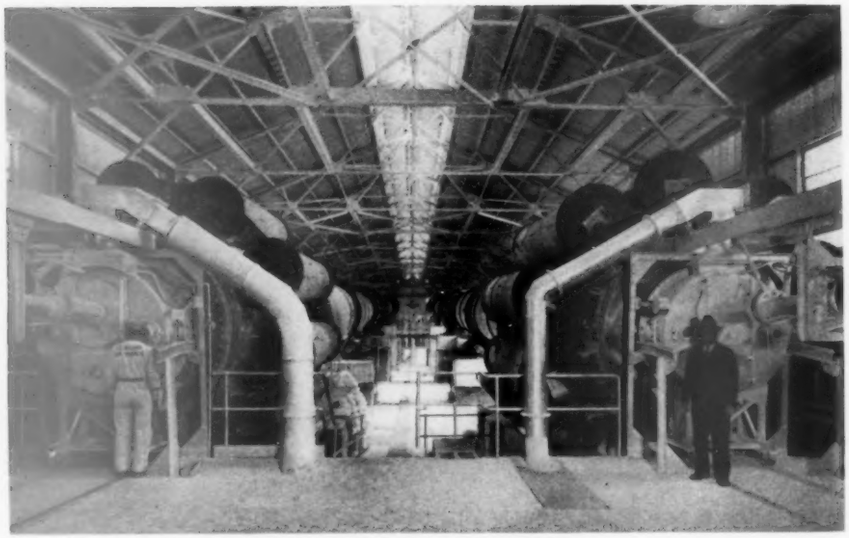


The fan which supplies draft to the new kiln.

been extended to serve the new kiln. The material is discharged north of main kiln building into trucks and is used for liming the soil on the extensive Millard farm properties.

Ordinarily the cooled quicklime is discharged from the cooler of the No. 2 kiln on a reciprocating conveyor feeding a hopper. The lime is discharged automatically from this hopper into a ½-ton skip-bucket, the entire system being similar in design to that serving the No. 1 kiln. The same Link-Belt skip-hoist which operates the original Link-Belt ship-buckets now also operates the new bucket in a balanced system. The new bucket discharges its contents over a Link-Belt 3-deck screen or direct into any of the 8 1,000-ton quicklime-storage silos as desired. This

Another panoramic plant view taken from the side opposite that shown on the preceding page.



Firing ends of the two kilns with coolers shown. Mr. Millard stands beside the new welded kiln.

system duplicates and parallels the original installation for the No. 1 kiln.

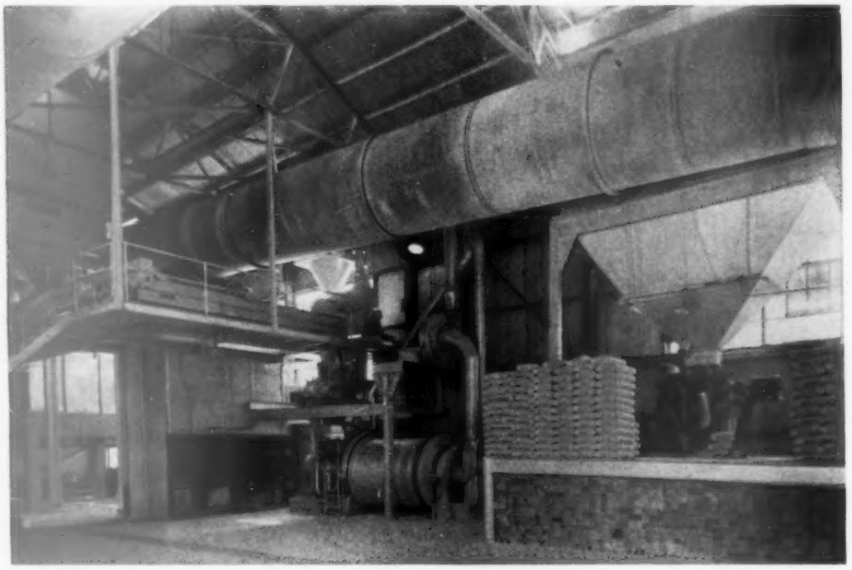
Only a few changes have been made in the mill building. The 5½- by 8-foot Kennedy Van Saun air-swept mill originally used for grinding hydrated separator rejects was found to be unnecessarily large for this work and was replaced by a similar 5- by 7-foot mill with the same features and appurtenances. The large mill is the one now used for limestone pulverizing.

A new Kennedy-Van Saun 5½- by 8-foot air-swept mill of the latest design was installed late in 1938 for quicklime grinding. This mill is equipped with the Kennedy-Van Saun mill-level control feed, integral drive-gear ring, and has a 5-foot cyclone in closed circuit. It has a capacity of 6 tons per hour when grinding to 93 per cent. through 325-mesh. As in the case of the mill it replaced, the product is discharged through two motor-driven air locks into a 100-ton steel tank over a 3-tube bag-packer.

The Kennedy-Van Saun level control takes advantage of the extreme sensitivity of a Wheatstone bridge and has a capacity condenser in each of the two legs of the bridge. The condenser of one leg is inside the mill and wired to the bridge. The condenser of the other leg is a variable air-condenser which is used to equilibrate the capacity of the condenser in the mill when there is no material between its plates. Whenever the level of the material rises between these plates, it displaces air as the dielectric of this condenser, increasing its capacity. The equilibrium between these condensers is thus broken and the current begins to flow in the center wire of the bridge. The higher the level rises, the greater the unbalance and the greater the flow of current through the center wire and the higher the meter reading. To obviate any inaccuracy due to leakage through the insulations between the plates of the mill condenser the frequency used has been increased to 100,000 C.P.S. making the d.-c. leakage small compared with the a.-c. measuring capacity.

The upper- and lower-level bin indicators in the surge bin which feeds the limestone pulverizer.

The limestone-pulverizing plant is located at one side of the kiln building,



The limestone-pulverizing mill and packer beneath the feed end of the new kiln. Screw-conveyors from bins are at upper left.

The new reciprocating conveyor and skip-bucket which serve the kiln recently installed.

under and near the feed end of the new kiln. The 5½- by 8-foot Kennedy-Van Saun air-swept mill is fed from a

(*Continued on page 31*)

By G. FAGERHOLT
Engineer, F. L. Smidth & Company, Copenhagen

South African Cement Plant Utilizes Raw Materials of Low Lime Content

A view of the plant showing the thickener and two hydroseparators.

IN the metallurgical industries a special method for cleaning low-grade ores has been employed for a good many years, the process being known as the flotation process. The result of experimental work first carried out in the United States showed that this method can be used with great success for concentrating calcium carbonate from raw materials containing a percentage of this compound.

Since the discovery of this field of application for the process considerable research work has been done for perfecting the method. It is thus possible to-day to treat many different types of impure limestones so that not only is the calcium-carbonate content increased but it is also possible to conduct the process in such a way that the other compounds required for the manufacture of Portland cement are found in approximately correct proportions in the treated material.

Limestone with different physical properties must, of course, be treated in different ways. Careful investigations of the raw materials must be made before it is possible to design a flotation plant in the most appropriate way.

It is no wonder that the knowledge of this process has caused many schemes for cement plants, previously abandoned on account of more or less unsuitable raw materials, to turn out interesting and profitable enterprises. A case in point is the cement factory erected at Hennenman, Orange Free State, South Africa, belonging to the Anglo-Alpha Cement, Ltd.

Near Hennenman on the Bloemfontein-Kroonstad-Johannesburg railway line limestone formations of greatly varying nature are found. It seems that in the course of time this limestone has been deposited by sub-soil water containing bicarbonate of lime in solution. It is comprehensible that the lime content of the deposits, therefore, depends on the amount and size of voids in the original layers in which the lime was deposited.

The limestone deposits at Hennenman have been found to contain less than 50 per cent. $CaCO_3$ on an average. At the experimental stage, as well as during the practical working of the cement plant in question, it was found that, in spite of this low content of lime, it was possible to turn the materials available into a raw mixture from which an ideal cement could be produced.

The Hennenman plant was started up early in 1937, and has thus been working for nearly three years. The quality of the cement produced is fully up to the level of the very best cement on the world market. In the following paragraphs is given a short description of the method employed at Hennenman of transforming the raw limestone in such a way that it can be used as a constituent in a mixture having a suitable composition for burning to cement clinker.

As mentioned, the structure of the limestone is very uneven. In the deposits hard and soft limestone mixed together, as well as high and low titrating materials, are quarried on the same spot. For this reason it is not possible to pick out the good limestone satisfactorily even if it were feasible from an economical point of view. Therefore, after removal of the overburden by means of a mechanical

shovel the limestone-carrying layer is blasted and handled by two other mechanical shovels.

The material is then transported to a crushing and screening plant on trucks, and by means of a slow-speed hammer-mill and two vibrating screens it is divided into three fractions, *viz.*:

I ¾-inch, 40% by weight with 80% $CaCO_3$.
II ¾- to ¼-inch, 10% by weight with 60% $CaCO_3$.
III ¼-inch, 50% by weight with 18% $CaCO_3$.

The silica moduli of all three fractions are found to be high, about 5 or 6.

Before the sizes of these screens were decided upon several tests were carried out in order to determine the working procedure giving the best economy. Due to the chemical composition and the physical properties of the raw material in question the best results are obtained when

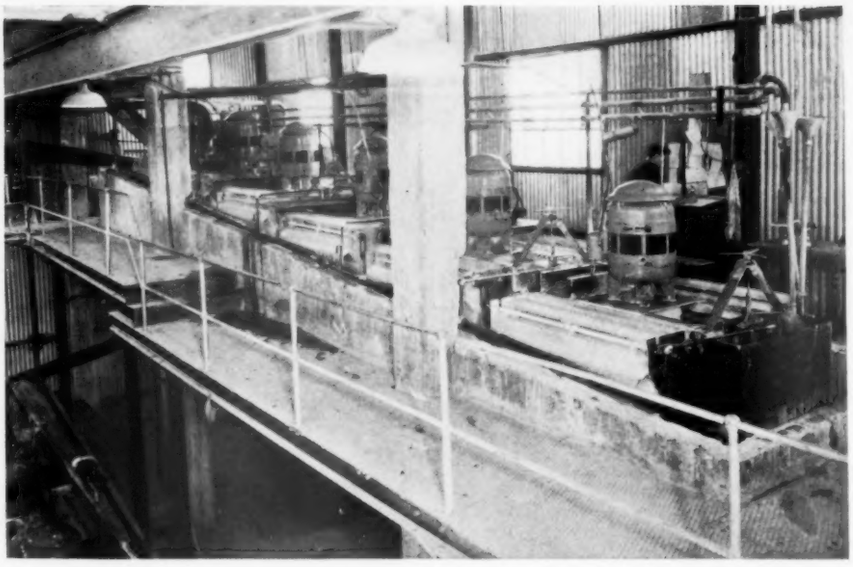
Fraction I is treated in the flotation plant,

Fraction II is used in the manufacture without any special treatment,

Fraction III is rejected due to the low calcium-carbonate content.

As already emphasized above, the silica content of Fraction I is so high that this material can not be employed directly as a raw material in the manufacture of Portland cement. Nor is it practicable by means of an addition of any natural material to correct this fraction. Finally, the lime content of this fraction is not so high that it can be used in connection with Fraction II, the employment of the latter fraction being desirable for economical reasons.

Due to these facts the flotation process is directed so as to raise the titration of Fraction I to 88 per cent. $CaCO_3$ and at the same time lower the silica modulus. It has been ascertained that it is economically possible to lower this modulus to from 3.0 to 3.2 by this procedure.



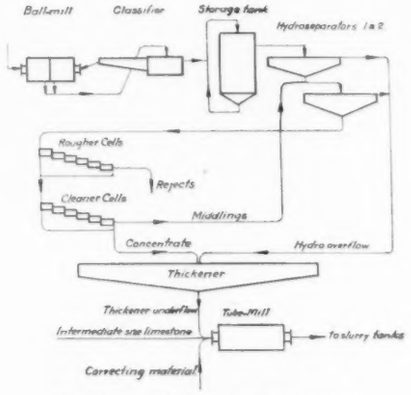
A row of flotation cells operating in series.

In order to make up for the higher silica modulus in Fraction II, a few per cent. of correcting material is added in the finishing raw mill.

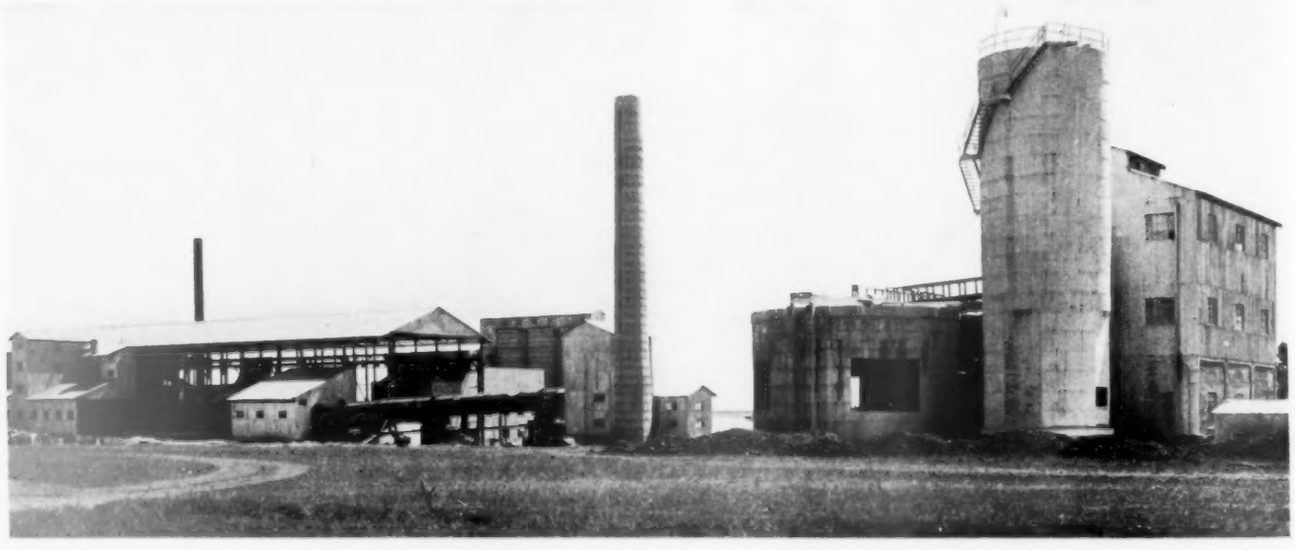
From the above it will be understood that this procedure has been arrived at after careful investigations carried out at the preliminary and experimental stages as well as later on during actual running.

As appears from the above, the raw materials found at different places in the quarry are of a very varying nature. With a view to this the flotation plant, as designed by F. L. Smidth and Company A/S, was constructed in such a way that it is possible by simple means to adapt the working to the varying nature of the raw materials to be used at any time.

The plant in which the limestone described as Fraction I is subjected to the flotation process is shown diagrammatically in the accompanying flow-sheet.



Flow-sheet of flotation processing.



Another plant view showing storage structures and the kiln; flotation department at right.

The limestone undergoes a preliminary coarse-grinding in the ball-mill, which works in connection with the bowl-and-rake classifier. The mill is provided with inlets at both ends and outlets in the middle. This design insures a cheap and handy arrangement. The limestone as received from the hammer-crusher is ground in the first compartment of the ball-mill, whereas the underflow from the classifier is returned to the second compartment of the ball-mill.

This preliminary grinding is conducted so as to give a fairly coarse product. It is carried exactly to the point of breaking up and dividing the minerals found in the limestone, which means that at this stage only a little of the grinding energy is transferred to the material, part of which will have to be rejected at a later stage.

The slurry, now containing from 20 to 25 per cent. of solids, is then pumped

The new 5½- by 8-foot mill used for pulverizing quick-lime.

to a storage tank where it is continuously agitated in order to keep the solids in suspension. From this tank it is sent to the two hydroseparators working in series. The overflow from these separators, containing about 84 per cent. $CaCO_3$, is sent direct to the thickener.

In the hydroseparators the finest part of the material overflows, this part being usable without further special treatment. The coarse-particle portion of the material settles down in the separators and from here it is pumped to the flotation cells. The latter are arranged in rows, all the cells of each row working in series.

In the first row, with the "rougher" cells, the $CaCO_3$ content is raised from about 70 per cent. to about 82 per cent. in the "rougher" concentrate, and the rejects, with a $CaCO_3$ content of 12 to 15 per cent., are pumped away.

In the cleaner cells following the "rougher" cells the lime in the "rougher" concentrate is further raised to 92 to 94 per cent. $CaCO_3$, and the middlings, with about 54 per cent. $CaCO_3$, are returned to the circuit.

The necessary reagents are added to the cells by means of individual feed apparatus, and the feed of material to the flotation cells is regulated to give a constant flow of slurry to the cells.

The solid-content of the slurry is kept as high as possible, being determined by the working optimum of the cells. The cleaner concentrate together with the hydroseparator-overflow is dewatered in the thickener, where the slurry settles down to normal consistency. The overflow from the thickener, being clear water, is again used in the preparation of the slurry. Finally the thickener underflow is pumped to the finishing mill.

In this mill the underflow from the thickener is ground in open circuit, together with the limestone, previously described as Fraction II, and a few per cent. correcting material. By the addition of these two components a finished slurry of the most suitable chemical composition is obtained.

In order to give a clear idea of the process, a schedule has been drawn up giving the approximate chemical analysis from the different steps in the manufacture of the slurry, and this is shown in the accompanying chart.

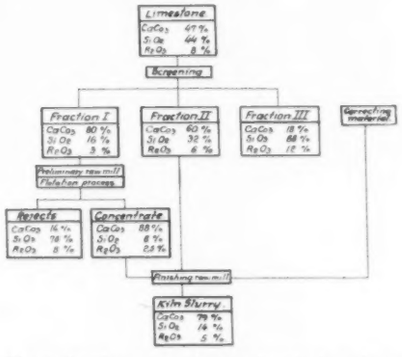


Chart showing approximate chemical analyses at various stages of slurry manufacture.

The daily working of the flotation plant is controlled by the laboratory. A very thorough and effective supervision of the flotation plant is, of course, necessary in order to obtain the best possible results. When this work is properly organized, however, it requires only very little time from the supervision personnel, and at Hennenman the daily routine work in the laboratory is carried out by a staff not greater than in a cement plant not using the flotation process.

Millard (from page 28)

surge hopper by means of a disk-feeder, which is synchronized with the feed screws to the hopper which were previously described. This arrangement, with Bindicators in the hopper to regulate high and low levels, accurately controls the feed to the mill. The mill product is drawn by a high-pressure fan through a series of three 5-foot cyclones of original design located above the kiln building. Ordinarily the first cyclone makes 75-per cent. through 20-mesh agricultural limestone, the second makes 85-per cent. through 200-mesh material for rock dusting or chemical uses, and the third makes a superfine dust used for special purposes. The combined output of these materials is 6 tons per hour. Each of the three products is discharged from its cyclone into one of three bins over a 2-tube bag-packer. Provisions also allow loading in bulk into cars. During the present season the demand for agricultural limestone has been so great that the entire output of pulverized limestone is being sold for this purpose.

Among other improvements made was the enlargement of the bag-storage department and the installation of hoists, platforms, etc. The importance of efficient operation in this department is evident from the fact that from 5,000 to 100,000 of each of 40 different sizes and types of bags is kept in stock.

With the two kilns and their appurtenant equipment in place this plant is now a complete and flexible operation which has in all ways measured up to original expectations. It is compact yet in no department is it crowded. Many refinements have been added since it was built to make it more efficient, pleasanter to work in, and more attractive in appearance. Concrete floors and driveways have been laid wherever needed and a landscaping program is under way. Modern wash-and-change-rooms have been built and no safety precautions have been overlooked.

Review Safety Record of Phosphate Industry

The accident experience of the pebble-phosphate industry in Florida for the 9-year period, 1930 to 1938, inclusive, in discussed in a report recently issued by the Bureau of Mines.

A review of the causes and classifications of the accidents shows that feet injuries are most frequent, with injuries to fingers running a close second. Hand material causes 20.2 per cent. of the accidents, falling persons is second with 18.9 per cent., and machinery third with 12.1 per cent.

During the 9-year period, 37 mines, washers, and plants, employing an average of 1,589.98 men with 35,661,788 man-hours of exposure and 833 lost-time accidents causing 62,305 lost days, produced more than 21,000,000 long tons of pebble phosphate.

The accident frequency rate for the industry is 23.38 and the severity rate, 1.779.

Insulating ROTARY LIME KILNS

PART II

By Theron C. Tayler

TEN years ago if a doctor diagnosed the ailment of a child as meningitis it was like pronouncing the death sentence. To-day, due to the development of chemistry, deaths from this disease are the exception. Thousands of lives are being saved. Spectacular! Front page for the newspapers.

If a business gets sick we let it die. We say it is wrongly located, poorly managed or find some other excuse. Its competitors consider the failure as a gain for them; it may give them more volume and a better price.

There is nothing spectacular about good business management or good engineering. A corporation is inanimate. Whether it is depleting its reserve or building it up is only a matter of dollars and cents. The public gets no thrill over saving the life of a sick corporation.

Advancement in the technique of saving lives is proceeding at a rapid pace. No sooner is a new chemical or treatment developed than all doctors know about it and we would be quick to censure them if they failed to make use of the latest development to save a life.

In industry, on the contrary, we are slow to discard the old and adopt the new. Plants consistently continue to operate "in the red;" how often do they seem to prefer to pay losses rather than stop them!

We need a jolt to wake us up to the possibilities that are all around us. Are we whipped by the low efficiency which is so characteristic of rotary lime-kiln installations or are we going to do something about it? Why are we plant managers and plant engineers so loath to adopt the new materials and methods which chemistry and engineering are so rapidly developing? By our procrastination are we not as subject to criticism as the doctor who fails to use the latest development in his line?

In the previous article it was shown that insulation in the calcining zone of a rotary kiln could increase the efficiency and perhaps the capacity also. Many have recognized this possibility and have tried to do something about it. There have been some failures and some limited successes.

When we recognize the cause of a failure we have a foundation upon which to build successfully. Perhaps it is well recognized by now that insulation used to save low-level heat (below 1,520 degrees F. in a high-calcium kiln), when that heat is used to heat the stone, can have no beneficial results. Many of those who have experimented with kiln insulation, especially at high temperatures, have had experience with shrinkage which caused bricks to loosen and fall out before the end of their useful life had been reached. Others question the value of insulation for the calcining zone, claiming that its value is nullified by the quick loss of sufficient liner thickness to make the heat flow through the shell if no insulation had been used. If these are the only reasons for refraining from the use of insulation they are insufficient to warrant continued waste of fuel and lack of kiln output.

Having already demonstrated that insulation, to have any value in the kiln, should be applied to zones in which the temperature is above the calcination point, we will now discuss ways and means to avoid failures by shrinkage and by softening, melting or sloughing off.

The usual method of insulating the rotary kiln is to place a layer of insulation between the liners and shell as indicated in Figure 1. The insulation is usually 2 to 3 inches in thickness. An efficient insulation used in the hot zone will have a temperature on the hot side of from 2,000 to 2,200 degrees F. The choice of insulating materials suitable for such a temperature is rather limited. I have used a porous fire-clay brick with rather unsatisfactory results. Much better, even quite satisfactory results, were obtained from the use of an integral cast insulation consisting of expanded mica and Lumnite cement.

The expansion of the shell, the insulation and the liners differ. Repeated heating and cooling of the kiln develop failures between the liners and the insulation. Once there is a separation between the layers there is a tendency for one surface to creep over the other. Wear of the surface of the insulation, infinitesimal at first, progresses at an ever-increasing rate to a point where the liners are sufficiently loosened to fall out before their full life has been utilized. The use of an increased proportion of cement in the insulation increases the life at the expense of insulating efficiency.

The gains made by such insulation in the burning zone and the occasional failures led to the adoption of a new idea as shown in Figure 2. Liners 9 inches by 9 inches by 4 inches were made up with a pocket in the outer or shell face. The pocket is 4 inches wide and extended to within ½ inch of each end of the liner. Thus, we have a ridge at each end ½ inch wide by 4 inches long in contact with the shell. This form of liner has many advantages. Due to the great difference in temperatures from liners to shell the liners are clamped very tightly by the shell. The heat loss to the shell is reduced, whether the hollow cavity remains filled with insulation or the insulation leaks out. Used in a shell with internal rivet heads such a form allows all the blocks to be laid firmly against the shell with little cutting. If a rivet interferes with a ridge it is very easy to remove a piece of the ridge. With a few fractional blocks and steel plate spacers I have found it possible to install these liners very rapidly with no cutting except for an occasional rivet head, leaving the inner surface of each block free to expand without pinching. A wide range of the most efficient insulation may be used with only enough

(Continued on page 34)

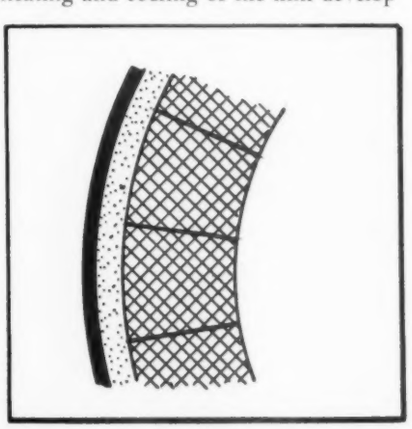


Figure 1.

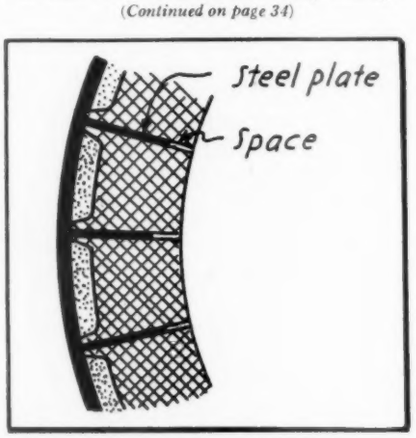


Figure 2.

A Review of Developments in the Nonmetallic-Minerals Industries

RECENT progress and general welfare of the many nonmetallic-mineral industries during 1939 are reviewed in the recently released Bureau of Mines Information Circular No. 7106 by Paul M. Tyler and Oliver Bowles. New uses, products and outstanding technologic changes are among the many interesting features discussed by the authors.

A number of the nonmetallic-mineral industries fared better than other businesses in 1939 due partly to the displacement of competitive materials but chiefly to the growth of certain consuming industries such as the glass-container, paper, chemical, and rubber industries. The increased volume of building construction during the year, as indicated by figures of F. W. Dodge Corporation, was beneficial directly to the companies processing the numerous nonmetallic structural materials. Better technology, through the introduction of new mining methods and more efficient processing machinery, has resulted in lower operating costs and the quality of many products has been improved by close control of the processing operation, by beneficiation of the raw material, and by standardization so that they are accepted readily by the consumer.

In the Portland-cement industry the use of froth flotation in the new 7,000-barrel-per-day plant of the Permanente Corporation at Los Altos, California, is of unusual interest. Limestone, obtained from a deposit previously rejected as containing unsuitable raw material, will be treated to remove excessive chert. The Valley Forge Cement Company, which has employed flotation at its West Conshohocken, Pennsylvania, plant since 1934, developed a modification of its treatment process in 1939 to remove excess mica by cationic reagents. Alumina, alkali and magnesia contents also are reduced sufficiently to make possible the manufacture of all standard types of Portland cement from the available raw materials. Froth-flotation equipment has been installed at the Brodhead, Pennsylvania, plant of the National Portland Cement Company.

At Leeds, Alabama, the Universal Atlas Cement Company completely rebuilt its plant, converting it into one of the most modern wet-process plants in the country. Notable features are the Woodford remote-control system of rock haulage, Dorr thickeners for dewatering slurry, and air-quenching of clinkers. Several companies installed new dust-collecting systems during the year and one of these found a market for the recovered dust for liming soil.

Other improvements, such as clinker coolers of the air-quenching type and unburned magnesite brick for cement-kiln linings, were more widely applied in the industry during 1939. In some installations of magnesite an insulating layer was placed between the lining and shell in the burning zone as well as in the cooler parts of the kiln.

As an aid for the biggest dry-grinding job in industry, a number of cement manufacturers now are employing the so-called grinding-aids for pulverizing cement clinker with resulting gains of 20 to 50 per cent. in grinding efficiency. T.D.A., one of the better known of these substances, is a mixture of organic and complex inorganic salts that is fed as a water solution into the pulverizing mill. In addition to increasing the grinding efficiency, it improves the quality of the cement because it disperses the cement particles in the concrete mix and catalyzes the hardening reaction. The cost of this material is about 1½ cents per barrel for ordinary cement and 3 cents for high-early-strength cement. Mechanical changes are the increasing use of truck haulage in cement-rock quarries of some producing districts and the trend towards maintenance of crushing equipment on the quarry floor connected with the mill by belt-conveyors.

A new type of high-plasticity masonry cement in which dried clay replaces lime is now on the market. Tests made by the Belgian Government show that the newly introduced supersulphate cement (Sealithor) is unusually impervious, expands slightly on setting, hardens in sea water, is resistant to chemical attack and is slightly stronger than Portland cement. It is made from granulated blast-furnace slag, a little slaked lime and an extraordinary amount of calcium sulphate. At the National Bureau of Standards studies of mineralizers to facilitate clinkering and to accelerate silicate formation in cement manufacture indicated that fluorspar and magnesium fluosilicate were effective.

Specifications for fine concrete aggregates are growing so rigid that many refinements have had to be made in production methods and equipment. Following experience at large dam projects in the Far West, an eastern company installed Dorr classifiers to fractionate sands into several sizes which are combined to yield a sand having a definitely controlled modulus of fineness. Producers of crushed stone, slag and gravel agreed upon further simplification of specifications and eliminated 12 sizes but established closer tolerances. In coarse aggregates a combination of two diverse sizes, commonly ¼ to 1 inch and 1 to 2½ inches, yields a desirable denser mixture. Gravity separation, in the past 2 or 3 years, is being employed to some extent in the sand-and-gravel industry to remove soft or porous particles, and crushed-stone producers are using log-washers to a greater extent to eliminate clay and friable pieces. Expanding markets are noted for such by-products of crushed-stone plants as stone sand, fillers and abrasive dusts. One special product is a minus ⅜-inch plus 8-mesh limestone sand for use as an antiskid material. According to a Bureau of Mines-W.P.A. study, the annual production per man employed in the crushed-stone industry rose from 1,200 tons in 1913 to 2,800 tons in 1936.

Studies by Prof. G. W. Bain of Amherst College have developed a new method for determining the endurance of marbles and for obtaining maximum transulcence and weather-resistant effects in fabricating the stone. This technique is based upon the crystallographic orientation of marble grains, the size of intergranular spaces and other associated physical and chemical phenomena.

In the lime industry a Bureau of Mines report shows that an insignificant percentage of the lime consumed in this country is made in very small plants and that large companies producing more than 50,000 tons per year have wide fluctuations in operating rates. Companies producing 10,000 to 50,000 tons annually are most regular in their operations. Although the industry's kiln capacity has increased steadily, the number of active kilns has decreased. A new use for lime is in the treatment of cannery wastes to reduce stream pollution. Lime manufacturers are becoming more interested in making masonry mortars and other advanced products in which lime is a major constituent.

The manufacture of refractory brick from dead-burned dolomite has been made practical only in recent years by the development of methods for preventing the hydration of the lime content. Stabilization of the dolomite may be achieved by the addition of a siliceous material, such as magnesium sili-

● By FORREST T. MOYER

cate, to convert the lime to a nonslagging compound. Dusting, which occurs as beta-dicalcium silicate, changes to gamma-dicalcium silicate, may be overcome by adding small amounts of boric or chromic oxides to the batch. A refractory, similar to the so-called magnesitic-dolomite of Quebec, Canada, is reported as now being made in the United States from dolomite with additions of Nevada brucite.

The largest consumption of bleaching clays is in the petroleum-refining industry for percolation or contact purposes. Recently a finely-ground activated absorbent-clay has been used in a patented method of combined fractional distillation and contact infiltration. The latest application of absorbent clays is in the catalytic refining of crude oils to secure a higher yield of gasoline in which process the use of these clays slightly lowers the temperature and greatly decreases the pressure at which cracking takes place. Properly treated bauxite is tending to replace natural bleaching clay in oil refining because it may be revivified indefinitely whereas fullers' earth loses its efficiency after 20 cycles. However, bauxite works well only with paraffin-base crudes. A new material competing with bleaching clays is "Magnesol," which is a synthetic magnesium silicate used in a newly-patented process of oil refining. American china clays have displaced imported clays for many uses and a newly developed coating clay, made by centrifuging high-grade domestic material, is competing with the best of imported clays and even with satin white. Experimental work with froth flotation by the Bureau of Mines has been successful in recovering kaolin from clay-washery waste.

New uses for bentonite are added each year to a wide variety of established uses. A new use is for coagulating the white water of paper mills and as such it clarifies the water and also improves the paper by adhering to the fiber. The newly-developed substitute for mica splittings, Alsifilm, is made by mixing suitable bentonite into a 2-per cent. dispersion with water, removing the coarse particles and evaporating or centrifuging the colloidal dispersion to a 6 to 8 per cent. gel which has the consistency of smooth paste. The gel is spread over a flat surface, struck off to an even thickness by passing under a knife and dried under a bank of incandescent electric lamps with infra-red reflectors. The sheets, which are made separately, are immersed in a hardening bath of either potassium hydroxide or lead acetate to render the film water-resistant. Commutator segments are made by pasting the sheets together with shellac or other binder and compressing them in a heated press. Aside from fundamental laboratory research, investigations are directed towards the production of a cambric-type insulating tape impregnated with Alsifilm, the combination of the material with glass fibers and the production of substitutes for built-up mica sheet and board. Another use of Alsifilm is as a substitute for paper for permanent records because it takes ink well, may be opacified with a dispersed pigment, and can be strengthened by the addition of noncombustible fibers.

Additions of nepheline syenite to pottery, semi-vitreous ware, sanitary porcelain, tile and structural-clay bodies are said by Professor Bole of Ohio State University to increase the fluxing action and lower the fusibility, thereby speeding firing and saving fuel. It also increases translucence and reduces warpage and crazing. In structural-clay bodies additions of 3 to 5 per cent. increases the vitrification and mechanical strength. The principal use of nepheline syenite, however, continues to be in glass manufacture. In North Carolina a pilot plant to beneficiate spodumene-bearing rock by flotation yields a spodumene-microcline product which is claimed to lower the fusion temperature of white-ware bodies when used in place of feldspar. The use of pyrophyllite in ceramic bodies is increasing rapidly. New uses for this material, which is mined in North Carolina, are as a patching refractory, known as "pyroplastic," for disintegrated firebrick and as a paint filler.

Aplite, a new raw material for glass making, is a white, massive rock consisting of albite, sericite, zoisite, microcline and other minerals. After grinding through 20-mesh screens and removing the fines, the product averages 0.27 per cent. iron and can be used only in amber, green or other colored-glass products. Another new glass-batch ingredient is a low-iron kyanite concentrate produced at Burnsville, North Carolina, by the Celo Mines, Inc.

Finely-powdered vermiculite, 98 per cent. through 325-mesh, is used as an extender for aluminum paint and as a coolant and lubricating agent in motor oils and greases. It disperses readily in lubricating oil and is recommended by the producer as a means of taking up uneven wear in automobile engines, increasing compression and reducing oil consumption by filling the pores of metallic surfaces within the cylinders. A ventilated masonry block for outside walls and load-bearing partitions have been made from graded vermiculite with Portland cement as a binder. The blocks will almost float on water and are claimed to have good insulating properties.

Tayler (from page 32

binder to keep it from sifting out. Such a construction used in the hot zone of a rotary kiln has proved highly durable and practical.

In most kilns used for making high-calcium lime and operated to their capacity it is found necessary to use 70-per cent. alumina bricks in the hot zone. Some of these tend to soften at the temperatures usually encountered. If insulated, the temperature of the bricks will be appreciably higher. The higher liner temperature will seriously reduce the life of such bricks.

Two things can be done. We can change the character of the flame to reduce the peak temperature by delaying combustion, or we can change the kind of bricks used in the hottest part of the hot zone.

The first plan may require some substantial change in burner design, perhaps a change to a multiple-burner installation. The alternative calls for the use of basic bricks. For a quality product, as well as for maximum capacity and high efficiency, it may be necessary to adopt both methods.

Basic bricks have been used very successfully for the hottest zones of many rotary lime kilns. Chemically-bonded magnesite is a much improved product and, when used under suitable conditions, has greatly reduced liner replacement costs per ton of output.

Due to the high conductivity of magnesite bricks, it is doubly important that insulation be used. They do not soften at any temperature obtainable in a lime kiln. They are subject to spalling due to temperature strains. When laid in the shell without any insulation, such bricks will have a temperature difference per inch of depth of 175 to 275 degrees F. With insulation this increment of temperature difference will be reduced to about 50 degrees per inch of depth. The internal strains will therefore be less when insulation is provided. Although not proved, we have reason to expect better results from insulated magnesite than from that which is not insulated. Research is needed to determine the best practice in the use of insulated magnesite bricks for zones where temperatures are too high for 70-per cent. alumina bricks.

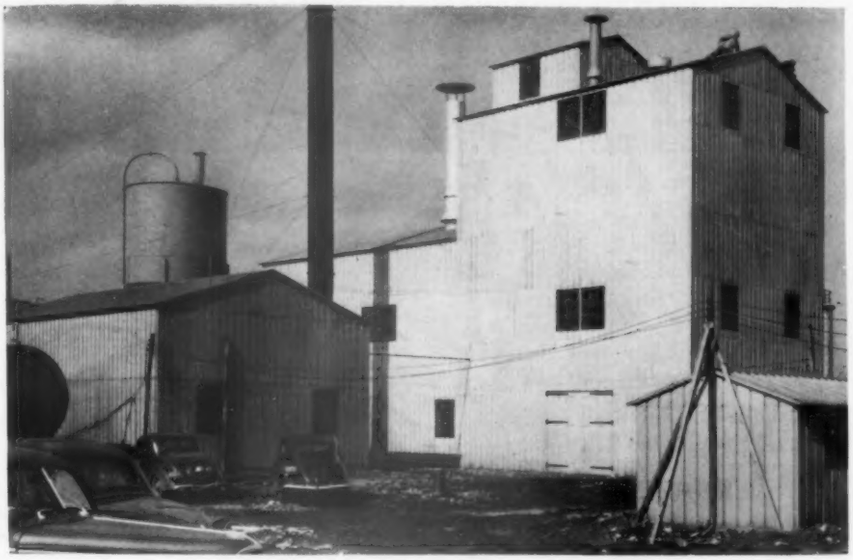
If lime management and engineering is going to progress as it should there is going to be an increasing interest in insulating the calcination zones of rotary kilns.

A 140-ton Bucyrus-Monighan walking drag-line has just been placed in service by the Basalt Rock Company of Healdsburg, California.

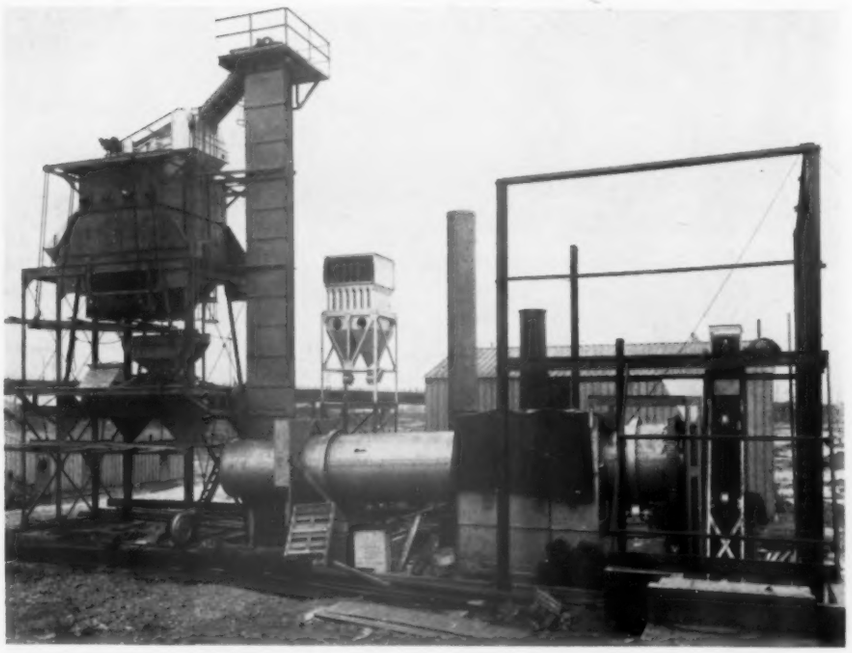
Constructs Asphalt Plant Under 10-Year Performance Guarantee

WHEN the City of Cleveland set out to buy an asphalt plant, the life of the plant was figured at ten years and the specifications included a performance-guarantee clause. In this clause the builder of the plant would have to guarantee performance costs over a period of ten years. These costs included labor, power, fuel-oil, water, maintenance and lubricants. The builder's bid was added to the builder's guaranteed performance cost and this determined the lump sum of the bid. The contract was then awarded to the lowest lump-sum bidder.

After the plant was built, in order to arrive at the actual performance cost the city ran a test for a period of 30 days, during which cost records were carefully tabulated. At the end of the 30-day period these costs were reduced to a 10-year basis and, accordingly, the actual performance cost over the 10-year period was determined. If the performance costs exceeded the guaranteed costs, the builder was then to be penalized for the amount of the deficiency over the 10-year period. The city required this performance guarantee broken into three brackets: 160, 320 and 480 tons of either hot or cold mixed asphaltic mixture per 8-hour day.



City of Cleveland plant after equipment was inclosed.



The drying-and-mixing unit shortly after the start of construction.

The plant, built by the F. D. Cummer & Sons Company, not only met the guarantees but bettered them in each bracket. The plant was completed three days ahead of the required time.

The City of Cleveland asphalt plant is run with only 6 men, including the superintendent and the boiler fireman.

Sand and stone are received in either cars or trucks and are deposited in a track hopper, whence they are conveyed to five concrete silos, each of 250 tons live-storage capacity by means of a belt and a vertical elevator. The elevator is equipped with a swivel spout at the top and an auxiliary belt-conveyor so that any of the silos can be completely filled. The bottom of each of these silos is equipped with a reciprocating feeder which distributes a regulated feed to a third belt-conveyor which conveys this material to the boot of the cold elevator at the drier. These feeders enable the operator to maintain a regular and proportioned feed at all times.

The drier is of the Cummer combination two-fire type. When making hot mix with this style of drier the material is dried at the front by the external burners and is heated at the rear by the internal fire. In this way the drying is balanced. When making cold mix the material is dried at the front and cooled toward the rear. The drier has a guaranteed capacity of 60 tons of sheet asphalt per hour but in actual test during the above-mentioned 30-day period this tonnage was often exceeded by 15 to 20 per cent.

After being discharged from the drier the aggregates are raised through a bucket-elevator to the Cummer-Robins 4-deck vibrating screen. This screen segregates the material and discharges it into a 4-compartment 60-ton bin.

The asphalt is received in tank-car lots and is pumped from the cars through heated asphalt lines to either one of two 60,000-gallon asphalt-storage tanks. These tanks are of the hot-well type built with a sump at the center of each. This sump is equipped with a concentrated number of steam coils and the asphalt is discharged at this point. As the heat is centered at the discharge point of the tank there is not a large quantity of asphalt to be kept heated at all times.

The asphalt is heated to about 350 degrees F. and is pumped to the mixer through a steam-driven, steam-packeted pump. This pump has a steam-packeted relief valve in the circulating system,

which maintains uniform pressure at the asphalt bucket.

The dust is received in hopper-bottom cars and is handled through a compressed-air conveying system manufactured by the Fuller Company. The dust is discharged from the cars into a small hopper and from there is conveyed to a large 200-ton storage bin. It is then drawn off as required into an auxiliary 8-ton service bin mounted adjacent to the main 60-ton bin. The dust-conveying system is equipped with a Y-valve so that the dust may be conveyed from the cars either to the main 200-ton storage bin or to the 8-ton service bin, as required.

The bottom of the 60-ton aggregate-storage bin is equipped with four vibrating feeders. The final discharge into the weigh-box is controlled by these feeders and the cut-off is made on the scales through an "electric eye" on the dial scale.

The asphalt is handled by means of a thrustor steam-jacketed, valve, which is automatically controlled by an "electric eye" on an asphalt dial scale.

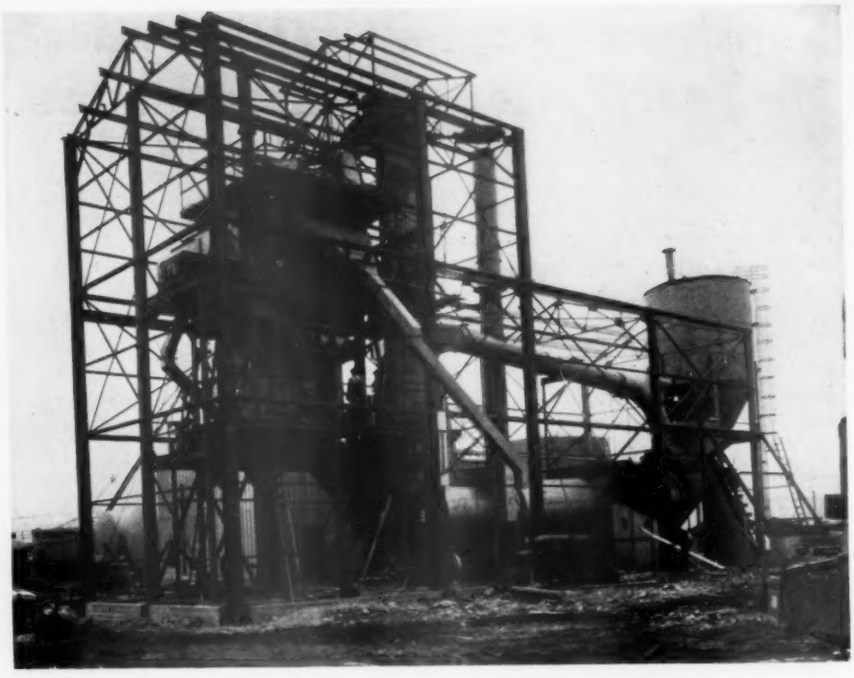
The mixer is the 4,000-pound Cummer heavy-duty type equipped with the latest type adjustable teeth. Mixing time is controlled by means of the Cummer-General Electric timer wherein the dry-mix and the wet-mix periods are mechanically controlled. Roller bearings are used throughout.

The entire plant is equipped with a Multiclone dust-collector system which collects more than 95 per cent. of the dust. The system is connected to the drier, the screen, the elevator and the mixer housing. The dust collected is returned to the hot-material elevator. In this manner the plant is practically dust-free. The dust-collecting system is connected to an extra large fan equipped with a variable-speed motor so that the air volume may be varied at any time.

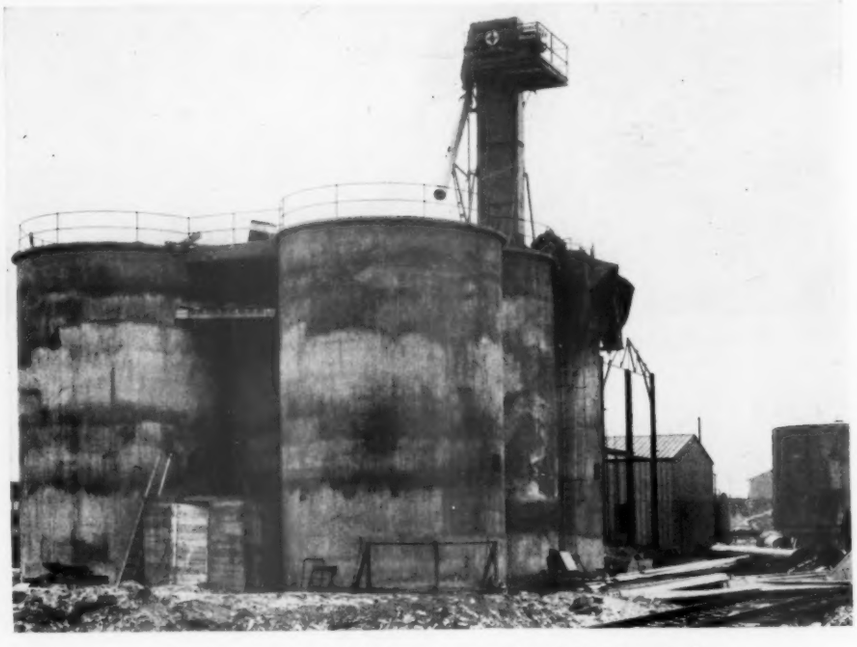
The fuel-oil is received in carload lots and is stored in a 25,000-gallon tank from which it is fed to low-pressure oil-burnings on the drier as well as on the boilers. The fuel-oil is thermostatically heated to a predetermined temperature before entering the burners so as to give high oil-burning efficiency.

The plant is equipped with two 150-horsepower horizontal return tubular boilers. One of these boilers is being used at present as plant equipment and the other will be used at some future date for another purpose. The steam condensate is returned for use in the boilers.

The plant is equipped with a 6-point potentiometer pyrometer, which keeps a correct daily record of the temperatures at the drier discharge, the weigh-box, the asphalt at the storage tanks, the asphalt at the mixer, the fuel-oil at the tanks, and the aggregates in the storage bin, the last mentioned being equipped with a 4-point switch so the temperature in any compartment can be registered separately.



After construction was well under way, with steel-work in place.



The storage silos which have a capacity of 250 tons each.

The entire drying and mixing unit is completely housed in a building of pressed galvanized-steel panels. The building is well lighted and equipped with ventilators.

The personnel in charge of the plant includes Miles Evans, director of public service; John C. Wenrick, commissioner of engineering; S. H. Murdock, assistant commissioner of engineering; Charles Sheets, commissioner of streets; and R. D. Brodie, engineer of construction.

The plant is located at Clark Avenue Bridge and West 3rd Street.

This is said to be the first asphalt plant ever built to specifications calling for a performance guarantee. It opens a new field in the purchase of equipment inasmuch as it assures the municipality of guaranteed operating costs. While the original price may be higher under such a purchase plan, over a 10-year period the saving in operating costs will more than reimburse the municipality for the money expended.

Performance Measurement and Mechanical Control-V

By ROBERT W. ROTHROCK, Ph.D.

TO THE casual observer it may seem that temperature is the all-important factor to be controlled in lime burning. Obviously this is true to the extent that the quality of the product is of prime importance. However, manufacture of the finished product must be accomplished at a profit and this means that the burning procedure must be carried out on an economical basis as regards fuel and other processing essentials. Therefore, measurement for the control of factors other than temperature enter into the production of lime as well as of cement, gypsum and other minerals. Among the more important broadly useful measurements are those made in attempting to keep the combustion processes within economical bounds.

The problems of combustion control for both rotary and vertical lime-kiln operation are similar to those of the cement and gypsum industries, although in some respects they differ. The differences, however, are of such a nature that a general discussion of combustion problems can be suggestive of modifications for making control applicable in one or the other industry.

The over-all process combustion economy can, of course, be determined from raw-material and production records by comparing the total fuel burned during a given period of operation to the total tonnage of product made during the same period. However, where a constant constituent analysis of combustion conditions is applied it has been found that this ratio can be considerably improved.

Some operators believe the experienced foreman can readily remedy combustion troubles by altering his firing procedure according to the appearance of the smoke issuing from the stack. Smoke observations at best are not entirely reliable as an indication of combustion conditions. Black smoke can usually be taken as an indication of insufficient air and, in the case of fuel oil, may also indicate poor atomization. White smoke generally indicates a considerable excess of air. This indication is practically useless in the wet cement process due to the large quantities of steam present. Between these two conditions of white and black smoke there is a range where much excess air may be present without a perceptible smoke indication. This is especially true in oil- or gas-firing. The best operating condition from the smoke standpoint occurs probably when black smoke is just eliminated.

Flue-Gas Analysis. — Carbon dioxide is one principal product of combustion. It is present in flue gases in an amount relatively proportionate to the amount of air supplied for combustion. In the normal firing of equipment such as boilers a measure of the carbon dioxide in the flue gas and the temperature of the flue gas serve as reasonable guides to combustion conditions. The guidance is sufficiently dependable that charts like those in Figs. 1 and 2 showing the relationship are used to estimate the economy of firing almost any fuel, based upon the carbon-dioxide content of the flue gases. In lime as in cement manufacture carbon dioxide is driven from limestone in the calcination or burning operation and, therefore, while the carbon-dioxide content of the flue gases is a guide to combustion conditions, it is not believed to be an entirely satisfactory means of determining the economy of firing because it is difficult to estimate continuously and with accuracy just how much of the carbon dioxide in the stack or flue gases comes from the limestone and how much is a product of the

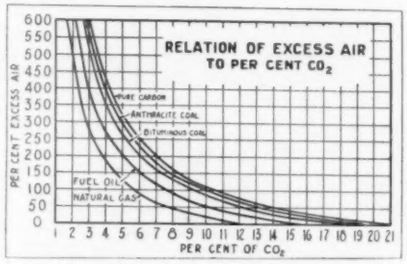
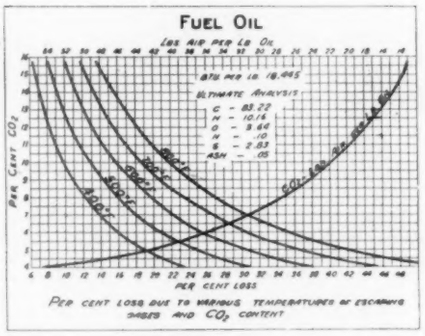
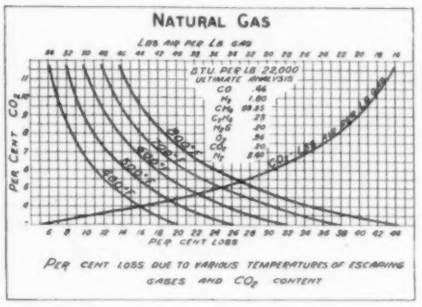


Fig. 1—Chart illustrating the maximum carbon-dioxide content possible to obtain in flue gases, indicated at intersection of curves with bottom line, also the relation of carbon dioxide to excess air.—(Courtesy Hays Corporation.)





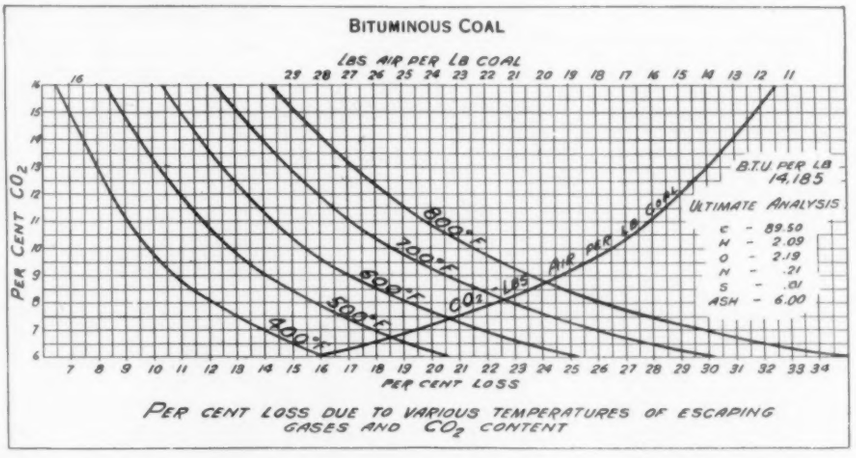


Fig. 2—Indices to combustion economy showing that high carbon-dioxide content with low flue-gas temperature is the guiding principle.—(Courtesy Hays Corporation.)

combustion of the fuel. However, by determining the weight of the lime produced over a given period, and having checked combustion by means of flue-gas analysis for carbon dioxide over that same period, the amount of carbon dioxide from the limestone can be determined mathematically, then deducted from the total found in the flue gases

Fig. 3—Portable model Orsat type of flue-gas analyzer.—(Courtesy Hays Corporation.)

and the economy of combustion may thus be estimated.

For more accurate control the measurement of carbon dioxide would be of greater value as an index to combustion conditions when accompanied by the measurement of other constituents to be found in the flue gases, such as free oxygen, and the unburned combustibles, carbon monoxide and hydrogen. All these, when measured along with temperature and draft, contribute collectively to a fuller knowledge of kiln conditions.

In Fig. 3 is shown a device known as the Orsat apparatus. This device is an absorption type gas analizer. It measures an original flue-gas sample by the method of bubbling through solutions of chemical compounds which react selectively with the individual flue-gas constituents and absorb them separately from the original flue-gas sample; the amount of the measured constituent being equivalent to the difference between the measured volume of gas bubbled through the absorbing liquid and the measured volume of gas remaining after the gas sample has been bubbled through the absorbing liquid. When manipulated for each absorbing tube through the steps A, B, C, and D as illustrated in Fig. 4, the device measures important flue-gas constituents, namely carbon dioxide, oxygen, and carbon monoxide. The Orsat is portable and hand-operated. While the portable feature has some advantages, measuring equipment which eliminates the human element of manipulation and produces a continuous picture rather than periodic measurements would seem more serviceable as a guide to combustion conditions.

The absorption principle is not restricted to portable flue-gas analyzing equipment; it is equally applicable in continuous measuring devices. There are, as well, several other types of apparatus quite broadly applicable, especially for the measure of carbon dioxide.

Electrical-Resistance Type.—There is an electric type which utilizes the difference in the resistance of air and of flue gas containing carbon dioxide to the conduction heat or, perhaps, it may be better termed the difference in resistance to the passage of an electrical current. The mechanism utilizes the principle of a divided electrical circuit pictured diagramatically in Fig. 5 and known as Wheatstone's bridge. When a current is passed through the circuit from A to B, heat is generated in the circuit. If the resistance to the passage of electrical current from A to B is the same in both sides of the divided circuit, there will not be any current flowing across through G. In application to the measurement of carbon dioxide the heat developed in the circuit is transmitted less rapidly through the flue-gas-filled cell than through the standard air-filled cell in proportion to

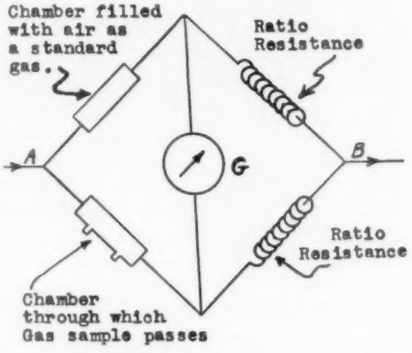


Fig. 5—Diagrammatic drawing of Wheatstone's bridge illustrating its application for measuring carbon-dioxide content of the gas.—(Courtesy Hays Corporation.)

the amount of carbon dioxide in the flue gas. This causes a corresponding difference in electrical resistance, the circuit becomes unbalanced and part of the electric current passes through G. This amount is measured and the readings are recorded directly as percentages of carbon dioxide. Other gases in the flue gas have practically the same resistance as air in the standard comparison cell

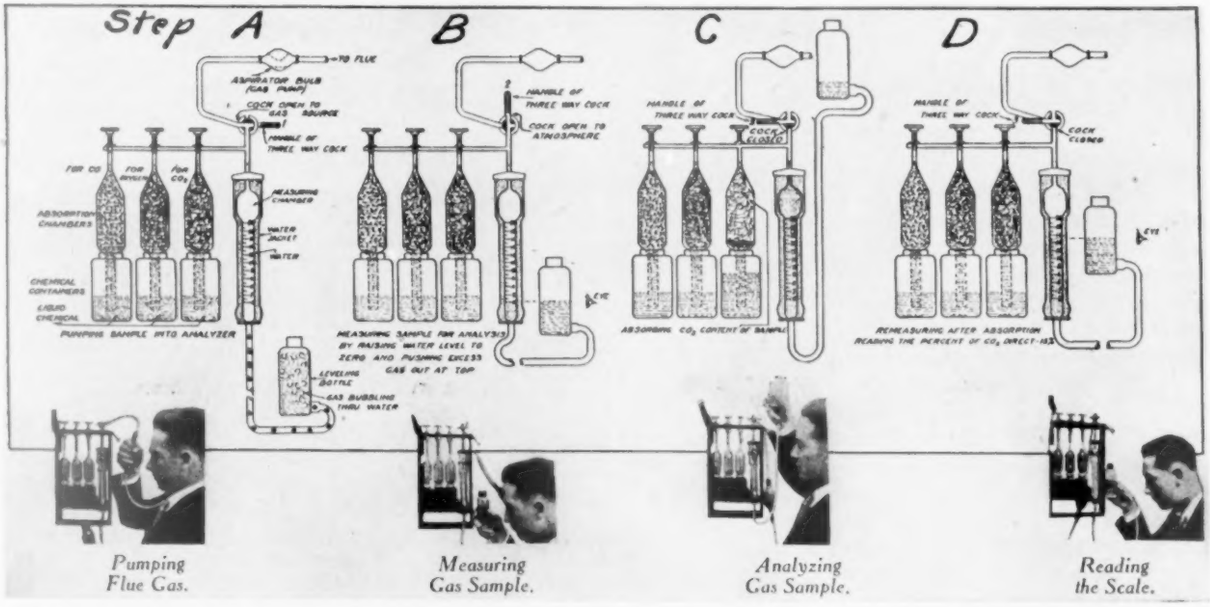


Fig. 4—Illustration of procedure in making flue-gas analysis with an Orsat-type apparatus.—(Courtesy Hays Corporation.)

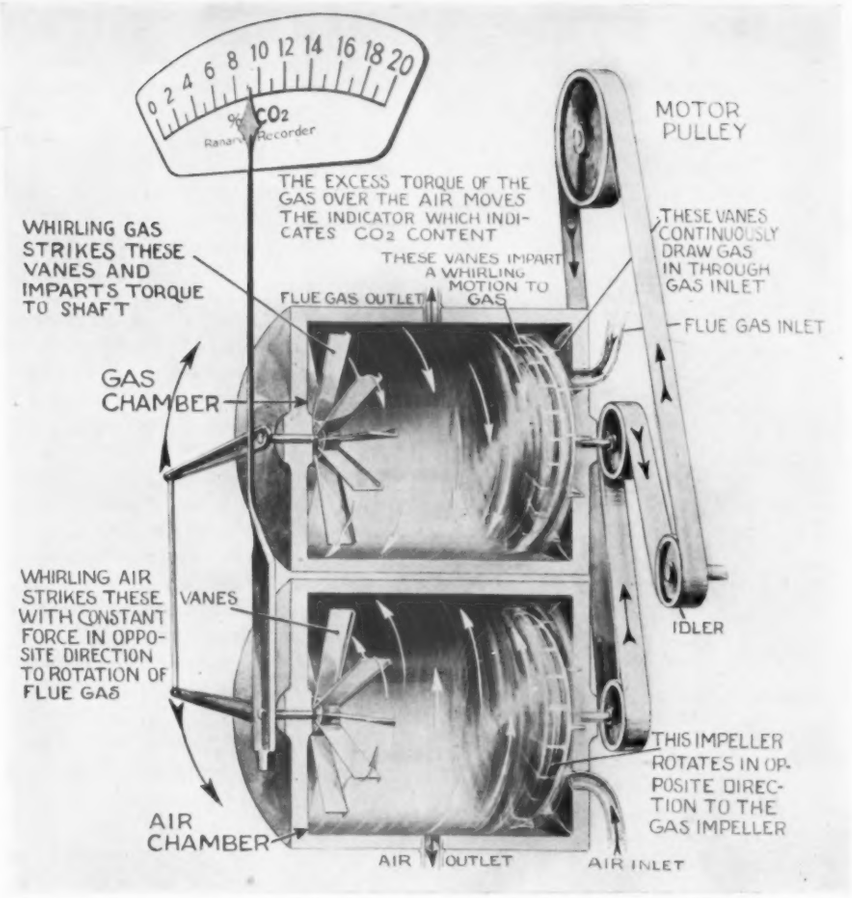

0 2 4 6 8 10 12 14 16 18 20
% CO2
Ranarex Recorder
MOTOR PULLEY
THE EXCESS TORQUE OF THE GAS OVER THE AIR MOVES THE INDICATOR WHICH INDICATES CO2 CONTENT
THESE VANES CONTINUOUSLY DRAW GAS IN THROUGH GAS INLET
WHIRLING GAS STRIKES THESE VANES AND IMPARTS TORQUE TO SHAFT
THESE VANES IMPART A WHIRLING MOTION TO GAS
FLUE GAS OUTLET
FLUE GAS INLET
GAS CHAMBER
WHIRLING AIR STRIKES THESE VANES WITH CONSTANT FORCE IN OPPOSITE DIRECTION TO ROTATION OF FLUE GAS
IDLER
THIS IMPELLER ROTATES IN OPPOSITE DIRECTION TO THE GAS IMPELLER
AIR CHAMBER
AIR OUTLET
AIR INLET

Fig. 6—Illustrating the principle of operation of "density" flue-gas-analysis apparatus.—(Courtesy Permutit Company.)

and therefore do not materially alter the unbalancing effect due to carbon dioxide.

Gas-Density Type.— This type depends for its operation upon changes in the density (weight) of gas with changes in the amount of carbon dioxide contained as compared with air. The density of flue gas becomes greater as the carbon-dioxide content increases.

In operation the flue gas is drawn into a chamber to which a rotating motion is imparted by means of a motor-driven fan as diagramatically shown in Fig. 6. This fan drives the flue gas against an impulse wheel in the opposite end of the chamber. For purposes of comparison air is similarly forced by another fan operating in an opposite direction against an impulse wheel in another chamber.

The fan-driven air sets up a certain torque at the impulse wheel; the fan-driven gas sets up an amount of torque which varies with the percentage of carbon dioxide present (variation in density). Through shaft connections these two torques are made to oppose each other and, of course, the amount of opposition is in proportion to the carbon-dioxide content of the flue gas since the other gases present have approximately the same density as air. The differences in opposing torques is calibrated to indicate or record directly the percentage of carbon dioxide in the flue gas.

Unburned Combustible Measuring Devices.— There are also instruments which record the amount of combustible gases or unburned gases present in flue gases. The measurement depends usually upon a change in the volume produced by causing the complete combustion of these remaining unburned gases.

In one such device shown in Fig. 7 the amount of unburned combustible gases is determined in two steps.

1. A measured sample of flue gas is automatically taken into the device and the carbon-dioxide or CO_2 content only is measured by absorption in a potassium-hydroxide solution and the amount of CO_2 recorded.

2. A second sample taken simultaneously with the first, is drawn into the device and caused to pass through an electrically heated chamber containing a catalizer and maintained at a temperature of above 300 degrees centigrade. Unburned gases are considered to be carbon monoxide (CO) and hydrogen (H_2). Any unburned gases in the original flue gas are completely burned in the heated chamber. The total CO_2 content is determined after this combustion takes place.

The CO_2 content after the complete combustion takes place represents the amount that should have been present in the flue gases had combustion been completed in the kiln or furnace. The difference between the CO_2 content found in Step 1 and Step 2 is taken as a measure of the amount of unburned gases.

Fig. 8 illustrates how clearly the $CO_2 - (CO + H_2)$ relation may be shown by recording devices. When the two curves cover each other on this chart no combustible gases are present. Where the curves separate, it is an indication that combustible gases ($CO + H_2$) are present. Note how clearly such a chart indicates poor combustion. The shaded portions (not shaded in practice however) represent the unburned gases, which in this case amount to as much as 6½ per cent. at A—B on the chart.

In any case where the measurement of carbon dioxides (CO_2) is made it seems it should be accompanied by measurement of any unburned combustible gases present, since a high CO_2 content in the stack gases is only economical if there are no combustible gases present. Heat losses caused by deficiency in air are even relatively greater than losses caused by an excess air supply for combustion. Under normal conditions the presence of 0.5 per cent. carbon monoxide (CO) produces a loss practically equal in magnitude to the loss when 20 per cent. excess air is used.

The value of continuous carbon-monoxide plus hydrogen ($CO + H_2$) records is brought out in analyses of the chart Fig. 9, showing a record from a

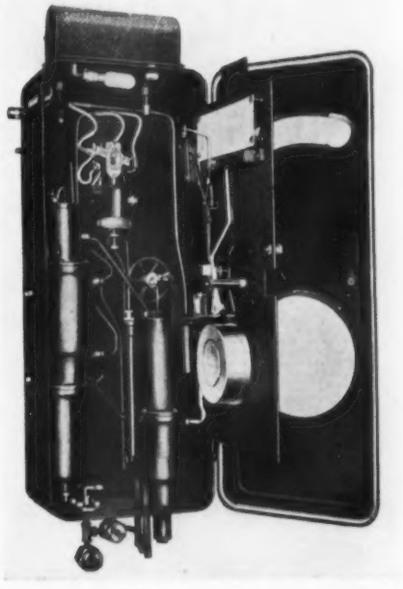


Fig. 7—Interior of unburned combustible-gas measuring device.—(Courtesy C. J. Tagliabue Mfg. Company.)

rotary cement kiln. During the period covered by this chart the CO_2 record only was available to the kiln firemen. The $CO + H_2$ recorder was put into service at 2 p. m., but its record was not available to the kiln firemen.

Fig. 10 is a record from the same kiln. During the period of this record of CO_2 and $CO + H_2$ records were available to the kiln firemen. The usefulness of a visual record of flue-gas constitutents accurately measured is quite clear in this case. Plainly the amount of combustible gases in the flue gases is greatly reduced as compared to operation without the $CO + H_2$ record. The savings in this particular operation were checked by actual fuel-consumption figures during the same periods and were equivalent to about 2½ pounds of coal per barrel of cement clinker.

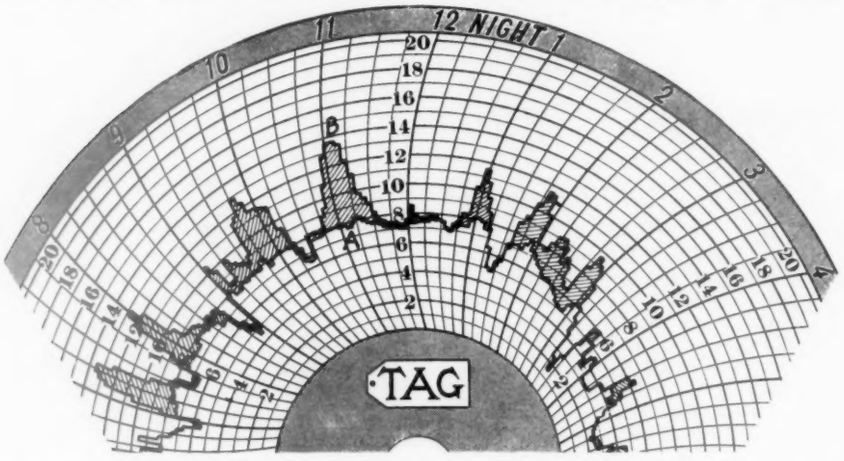


Fig. 8—Visual guidance to combustion conditions, variations in the size of shaded area representing the relative amounts of unburned gases ($CO+H_2$) in the flue gas.—(Courtesy C. J. Tagliabue Manufacturing Company.)

Oxygen Determination. — Carbon monoxide and other combustible gases can not exist at usual kiln temperatures in the presence of appreciable amounts of free oxygen. However, under conditions that allow air to filter into the gases after the combustion process occurs carbon monoxide may appear in the stack gases in the presence of considerable free oxygen.

The use of both oxygen and carbon-monoxide measuring equipment is believed to insure more accurate control than the use of either alone. The oxygen content indicates how much air in excess of that required for complete combustion has passed through the furnace or kiln, while the carbon-monoxide content, if any, indicates whether or not sufficient air is passing into the furnace or kiln to bring about complete combustion of the fuel used. However, where there is no infiltration of air after the fuel-burning zone, a knowledge of the free-oxygen content of the stack gases is a conclusive indication of combustion conditions. The complete absence of oxygen in the stack gases shows that combustion has been incomplete, while the presence of more than 2 or 3 per cent. free oxygen shows that too great an amount of excess of air has been used. This limit is seen to be important when one considers the fact that for each 1 per cent. of oxygen present there is also four times that much nitrogen present, which must needlessly be heated to stack temperatures.

The reduction of any such unnecessary heat losses is important to the profitable success of any manufacturing process utilizing heat. Even though many mineral manufacturers show little interest in instruments as aids to combustion control, the savings made possible through their application seems so apparent that more, if not all, manufacturers should attempt to improve the economy of their operations through the effective guidance of combustion-control instruments.

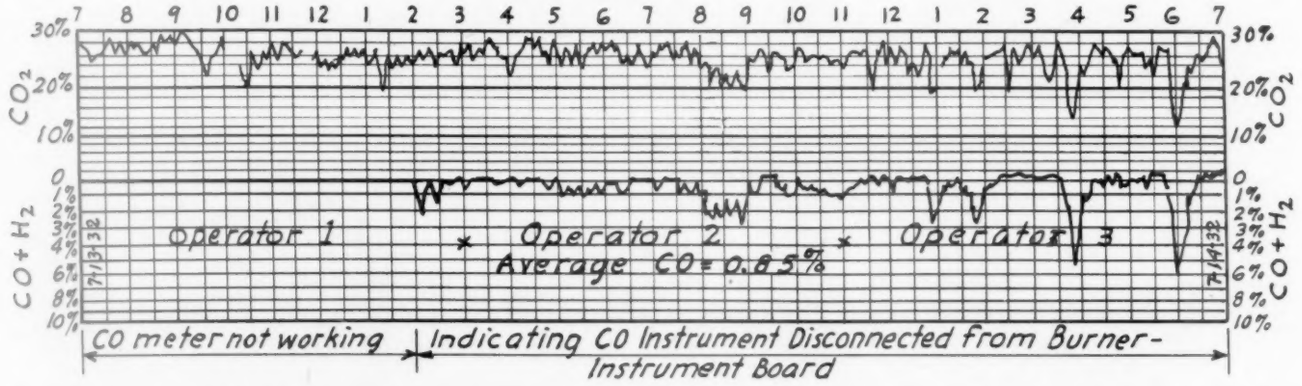


Fig. 9—Rotary cement-kiln flue-gas record where fireman was allowed to observe only the CO_2 record as a guide to combustion condition.

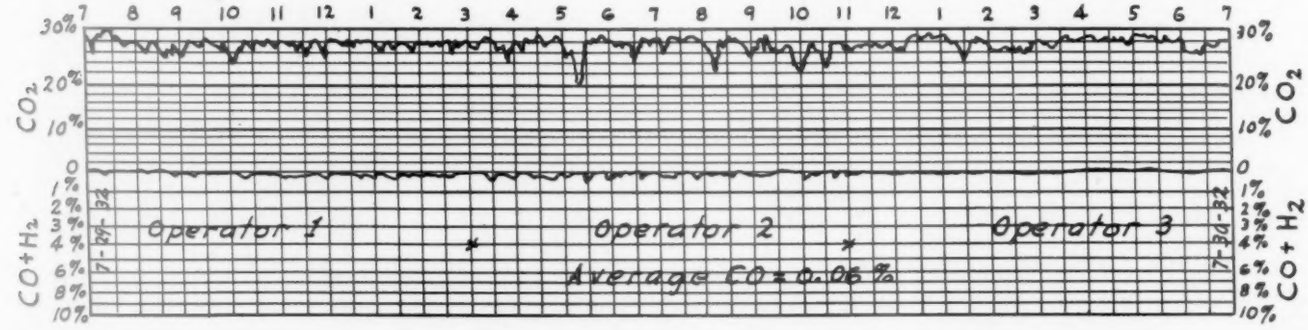


Fig. 10—Rotary cement-kiln flue-gas record where kiln fireman was allowed to observe both the CO_2 and $(CO+H_2)$ records as a guide to combustion conditions.

COST KEEPING FOR SUPERINTENDENTS

By a SUPERINTENDENT

BEFORE launching on our subject, it would seem advisable to offer some introductory remarks, which, if they wander slightly from the subject, the writer hopes may at least be of interest and perhaps of value. This article is written by a superintendent, not by an accountant or an auditor, and is designed to give information as to how economically—or the reverse—the work is being carried on, although it can also be used as a cost report on which to base selling prices.

It can be simplified to cover merely those costs which are controllable and need not concern itself with uncontrollables. However, it is our experience that there are very few items which are uncontrollable and we prefer to have all the information possible. As the greatest value of this report is in the comparisons, it is necessary always to have the same items of cost and not to include an item in one month and not in another.

We have always had cost reports in this plant, but while these reports were quite satisfactory in giving information in regard to the cost of production, they were of no value except to the clerical staff.

For years we hunted for some satisfactory system but without success. Finally we evolved the present one ourselves, and, with slight changes, this has been in operation for ten years. It is impossible to figure out exactly what the savings are, as there are factors affecting operation which cause differences in conditions, but that substantial savings in operating costs have been obtained is undoubted.

Now this article is for superintendents —a fine but often unappreciated body of men—and there is an angle which will appeal to them, which is that this system will enable them to judge the value of each man or each group of men. Men appreciate fair treatment. The writer can speak from experience as laborer, mechanic, engineer, foreman and superintendent (nearly a quarter of a century in the last position without labor trouble), and the exact information received from this report has been of great value.

(By digression let me say that, if you can tell a man quietly that he is falling down on his job, that the cost of handling his work has increased and that he had better see what he can do about it, you are apt to get results. It is even better to inform a man that he has done well and that his wages are going up. Treat men squarely, pay a reasonable wage, and, if possible, take a personal interest in your employees. These things will do more to eliminate labor troubles than all the labor legislation and social schemes in the world.)

Three books are required for this system. First, an ordinary 10 cent time book. The men's names are entered in this and each one is given a number. The total number of hours worked in the day are entered here. The highest-paid men come first. The second book is a diary, about 8 inches by 10 inches, one page to a day, and ruled horizontally. Spacing is immaterial, but there must be enough lines to take care of all the men. The page is then ruled vertically according to the number of jobs.

MONDAY, OCTOBER 7

	11	12	14	23	24	25	26	27	210	213	214	33	33				
1 2	4		2	8								2					
3 4	2		4		6								2				
5 6				8													
7 8																	
9 10																	
11 12																	
13 14																	
15 16																	
17 18																	
19 20																	
21 22																	
23 24																	
25 26																	
27 28																	
29 30																	
31 32																	
33 34																	
35 36																	
37 38																	
39 40																	
41 42																	Total per day
Totals	22.95	3.90	2.65	16.80													

Fig. 1

OCTOBER, 1939

DATE	1	2	4	2 1	2	3	4	5	6	7	10	11	12	13	14	15	3 1	2	3	0 11	0 14	0 24	0 26	0 33	SUPER.	GENERAL	MISC.
1																											
2																											
4																											
5																											
6	22 95	3 90	2 65			16 80																					
7																											
8																											
9																											
11																											
12																											
13																											
14																											
15																											
16																											
18																											
19																											
20																											
21																											
22																											
23																											
24																											
26																											
27																											
28																											
29																											
30																											

Fig. 2.

Each operation has a key number—stripping 1, limestone and lime 2, crushed stone 3. Below is a partial list of our distribution; users can make their own to suit themselves.

STRIPPING No. 1		LIME No. 2		CRUSHED STONE No. 3	
Shovel	1	Drilling	1	Drilling	1
Trucks	2	Blasting	2	Blasting	2
Carts	3	Breaking	3	Hauling	3
Hand	4	Hauling	4	Crusher	4
		Burning	5	Loading cars	5
		Fuelling	6		
		Load lime	7		

Repairs are indicated by prefixing the number 0, maintenance 00, additions to plant 000.

The accompanying sample (Fig. 1) of a page from the diary shows how the distribution is made.

On the left is the man's number. No. 1 worked on the shovel stripping for 4 hours; this is under 11 (Stripping 1 and shovel 1). Then he had 2 hours stripping by hand 14 (stripping 1 and hand 4), and 2 hours on crushed-stone hauling, 33 and (crushed stone 3 and hauling 3), and so on down the page.

Entries are made at the end of the day. The next morning the columns are totalled. This may seem quite a job at the start but it is surprising how soon the foreman or superintendent can get into his memory all the different numbers and the time spent on the jobs. If necessary, a small notebook may be carried at first and the changes noted. Our own experience is that the daily entry for about 50 men does not take more than 10 minutes, and about the same time to total in the morning. The totals are, of course, in dollars and cents.

These daily totals are then transferred to the third book (Fig. 2). This is about 10 inches by 12 inches quadrille, ¼ inch to the square. In this the date is put at the left-hand side and the amounts extended horizontally. We endeavor to make this as detailed as possible. At the end of the month this is totalled and should agree with the amount of the wages in the pay-roll. The results of this form are now transferred to the Monthly Report (Fig. 3).

There are many items, all of interest to the superintendent but not of importance to the head office, so they are condensed. Copy is shown. It is divided into Lime and Crushed Stone. The first item under Lime is the stock on hand for the previous month. The second is the stock on hand at the end of the current month. This need only be a rough estimate. The next item is the sales, taken from car-load, truck-load and local sales. The total sales in tons are added to the stock for the current month and the previous month's stock is subtracted, leaving the total under Production. The different items are divided by this amount, giving the cost per ton or cubic yard for each job. In crushed stone we do not bother about stock, only production. The total lime production for the month is added to the production for the previous month or months and gives the production to date for the year.

As shown on the report, the headings are Amount and Cost. These are, respectively, the amount of money spent on the operation and the cost per ton of

MATERIALS AND SUNDRIES—OCTOBER 1939

	Lime						Crushed Stone			
	October				10 Months		October		10 Months	
	Sundries	Cost	Amt.	Cost per Ton	Amt.	Cost per Ton	Amt.	Cost per cu. yd.	Amt.	Cost per cu. yd.
Kiln Wood	$	$	$	$	$	$	$	$	$	$
Kiln Coal										
Hoist Coal										
Explosives										
Stable										
Electric Power										
Repairs Lime										
Repairs Crushed Stone										
As many items in this part as necessary.										
Gas & oil Stripping										
Gas & oil Drilling										
Gas & oil, Etc										
Gas & oil, Etc as above.										
Empty sacks										
Empty barrels										
Miscellaneous										

Fig. 3.

QUARRIES—OCTOBER 1939

	Lime						Crushed Stone			
	Stock (tons)		Sales Tons		Production		Production			
	Sept.	Oct.			Oct.	10 Mos.	Oct.		10 Months	
			Lime				Crushed Stone			
LABOR			October		10 Months		October		10 Months	
	Sundries	Cost	Amt.	Cost per Ton	Amt.	Cost per Ton	Amt.	Cost per cu. yd.	Amt.	Cost per cu. yd.
	1	2	3	4	5	6	7	8	9	10
Stripping	$	$	$	$	$	$	$	$	$	$
Drilling										
Blasting										
Filling Kilns										
Fuel to kilns										
Burning										
Stable										
Load bulk lime										
Load barrelled lime										
Load sacked lime										
Supervision										
General										
Repairs Kiln										
Repairs General										
(As many items in this section as necessary.)										
Crushing & Loading										
Trucking										
Miscellaneous										
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Summary

	Lime		Crushed Stone	
	October	10 Months	October	10 Months
Total labor cost	.....	.....	.....	.....
Total material cost	.....	.....	.....	.....

Fig. 4.

lime or cubic yard of crushed stone carried to the one-hundredth part of a cent.

All costs, however, are not entered in these columns, only those which are comparable from month to month. We stop at the point when the lime is taken from the kilns, otherwise our totals would be thrown out. To take care of the further handling of the product there is the column headed Sundries. Therefore, to find the cost of a ton of barrelled lime it is necessary to add the cost of filling the barrels to the total cost of producing the lime. All the operations of the plant after the lime is actually produced are, therefore, placed in the Sundries column.

The item Miscellaneous is used for anything outside quarry operation for which payment is made to us. We do not use the Sundries column for crushed stone, but if there were much stockpiling to be done it might be advisable to use it for that item.

Columns numbered 3 and 4 and 7 and 8 are used every month. Columns 5 and 6 and 9 and 10 need only be used quarterly, half-yearly or annually as desired, but all columns are brought up to date in the totals.

This finishes the labor end. We later added a slightly different Material-Cost Form. To keep this we simply enter the amount of each invoice received in its particular department, or, in the case of a number of items in the invoice, the items are distributed. Entries are made in the month in which the invoices are received. Items such as coal or explosives are not entered but are taken care of by a memo ticket as used. From these entries the monthly report is made. A sample of this report is shown with a summary of labor and material costs (Fig. 4).

The advantage of this cost report is its flexibility. It can be extended to give a complete picture of all costs (including overhead and depreciation) or limited to the minimum number of controllable operations, and one does not need to be an expert to compile or understand it.

Production Trends in the Aggregates Field

Sand specifications are growing so rigid that production methods and equipment for making finer sizes may have to be changed, the Bureau of Mines reports. Following experience at large dam projects in the Far West, an eastern company has introduced a series of Dorr classifiers to fractionate sands into several sizes, which are combined later to give a sand having a definitely controlled modulus of fineness.

In Pennsylvania the Department of Highways recommends square-mesh testing sieves for crushed stone, a real help to producers who use square-mesh screens in production. Still another trend in specifications is to combine two diverse sizes of concrete aggregate to obtain a denser mixture. Common requirements are ¼ inch to 1 inch, and 1 inch to 2½ inches. In the past 2 or 3 years gravity separation is being employed to some extent in the sand and gravel industry to remove shale, shell, coal, lignite, and soft or porous particles generally. Many of these particles, being more easily crushed, tend to be more plentiful in the smaller sand sizes. Log washers were employed more and more to eliminate clay and friable pieces from crushed stone.

The wide use of graded aggregates impregnated with bituminous material on secondary roads has led to accumulations of fines (minus ⅜-inch) at crushed-stone plants. Several hundred thousand tons of such material were used in concrete construction in Pennsylvania in 1939. In that state there has been a growing use of low-priced materials for secondary roads, including field stone, discarded ganister, mine waste, "red dog," and slag.

That improvement of products does not necessarily impair efficiency is indicated by a comprehensive study sponsored by the Bureau of Mines in cooperation with the W.P.A. For the crushed-stone industry, according to the report recently published, the annual production per man employed jumped from 1,200 tons in 1913 to 2,800 tons in 1936.

Lightweight aggregates are growing more important, being used in bridge decks and in general construction. A recent development is to employ them in precast units and special shapes, including masonry and back-up units, building brick, floor beams, columns, roof and floor tile, and slabs.

OBSERVE CENTENNIAL OF MINERAL WOOL

NEARLY 300 producers of mineral wool and members of their sales, distributor and dealer organizations gathered at the Chicago Towers Club at Chicago on Thursday, May 16, for the largest gathering of this group ever held.

The meeting, sponsored by the National Mineral Wool Association, was in the nature of a centennial celebration of the manufacture of mineral wool. For, according to the United States Department of the Interior, the material was first produced in Wales in 1840, although the first production in the United States was from a cupola at Greenwood, New Jersey in 1867. A few years later, in 1875, the Parrott family, famous gun manufacturers for the Union forces during the Civil War, began the manufacture of mineral wool from waste slag from their iron foundries.

Mineral wool has achieved its present country-wide acceptance, however, only in the last two decades. This was primarily due to the development of modern methods of manufacture which have taken it out of the luxury class and made it available to home owners in every income group. To-day, its fastest growing market is in the insulating of side walls and top floor ceilings of low-cost houses, such as the new $2,500 home now on display at the New York World's Fair.

The feature of the Chicago gathering was a technical session held in the afternoon at which Jan S. Irvine, chairman of the association's Technical Committee, presided. Frank B. Rowley, director of the engineering experiment station of the University of Minnesota, spoke on the research and development program being conducted at the station. He pointed out that two essential factors are required for the commercial success of any product. First, it must have unquestionable merit; and second, its merit must be recognized and promoted and protected by men with vision and determination.

"It is only those materials which possess superior qualities and which have been scientifically developed both as to their properties and application that can ever become the basis of an industry. Many materials with good average qualities fail to gain a place in industry due to superior properties or greater adaptability of competing materials. It is not easy to rate the merits of a material in the initial stages of its development as the merits of its various properties are relative to those of other materials which may be in existence or which may later be developed, and the product's usefulness will depend upon many changing and uncontrolled conditions which can not be predicted in advance. Fortunately mineral wool has gone through these initial stages and has proved its merits by the fact that it has survived for a hundred years in the face of keen competition. It has not only survived the one-hundred-year test but it has enjoyed an accelerated and almost phenomenal growth both in the quality of the product and public acceptance during the immediate past."

Mr. Rowley described the tests being carried out in studies of condensation and other factors at the university and declared:

"There are numerous unsolved problems in connection with the insulation industry. Most of them are of interest to both the mineral-wool manufacturers and the public, but to predict the research problems which will be undertaken in the future is outside the field of this paper. They will depend largely upon what is expected from the industry by those who have its destiny at stake. If the policy as outlined and followed by those now in charge and by the Technical Committee who have been largely responsible for the research program carried out during the past three and a half years is followed, it appears certain that the mineral-wool industry may continue to enjoy that accelerated development which has recently taken place and which, to some extent, must certainly be accredited to the far-sighted and carefully planned research program which the industry as a whole has seen fit to support."

Further problems involved in studies of condensation were discussed by L. V. Teesdale, senior engineer of the forest-products laboratory of the U. S. Department of Agriculture, and by W. T. Miller, associate professor of heating and ventilating at Purdue University.

S. Konzo, an assistant professor in mechanical engineering at the University of Illinois, described the tests he has carried out in the Research Residence at the university which he occupies with his family. The residence, originally uninsulated, is now saving more than 30 per cent. in fuel cost since mineral-wool insulation was installed in its walls and ceilings.

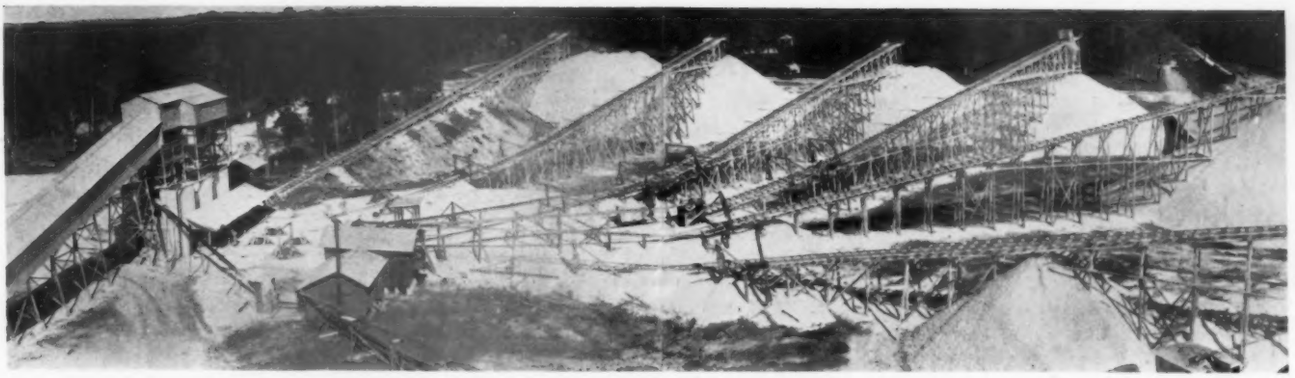
Benefits derived from mineral-wool insulation in the workers' houses erected at the various dam sites of the Tennessee Valley Authority were described by Woodruff H. Purnell, on the architectural staff of the T.V.A. Summarizing the study, the Authority found by tests of identical houses, insulated and uninsulated, that the insulation used stopped 44.75 per cent. of the heat loss. The tests were made in occupied houses with daily household routines as has been described. "It can be reasonably calculated from the test data," said Mr. Purnell, "that the insulation would have saved, had the house been heated continuously night and day, approximately 55 per cent. of the heat loss.

"Insulation, if economical, is additionally desirable from the standpoint of the increase in comfort. Even if the fuel and capital costs of heating no more than offset the cost of insulation, insulating is more than worthwhile. In this respect, the home owner is willing to spend a few extra dollars for well-designed household equipment that is in daily use. Such equipment makes housework easier, its improved appearance is an additional pride and satisfaction of home ownership. These things the owner can see. But insulation can not be seen and its value is often overlooked. My advice to the home owner would be that he determine whether or not he will lose any money by insulating. And if he finds that he will not lose money, he will gain by insulating."

Divertissement following the afternoon session was provided by the Chicago Towers Club aquatic team in one of the club swimming pools. Swimming and fancy diving were demonstrated by Olympic and A.A.U. champions while a water ballet and a pageant of bathing costumes over the last 100 years were enjoyed by the spectators.

James R. Addington, president of the association and head of the American Rock Wool Company, was the toastmaster at the Centennial Banquet held in the evening. Speakers included F. E. Giesecke, president of the American Society of Heating and Ventilating Engineers, who discussed the *Effect of Higher Interior Wall Surface Temperatures on Economy and Comfort;* Robert K. Thulman of the Federal Housing Administration, who proposed a basis for determining minimum requirements for insulation; and G. Hicks Fallin, president of the Society of Residential Appraisers, who discussed the mortgage-lender's interest in adequate insulation.

Arrangements for the meeting were made by Wharton Clay, secretary of the association, which maintains offices at 1270 Sixth Avenue, New York City.



A composite view of the plant and stock-piling inclines as seen from the water tower.

New Florida Crushed-Stone Plant Has Unusual 150,000-Ton Storage System

By W. E. TRAUFFER

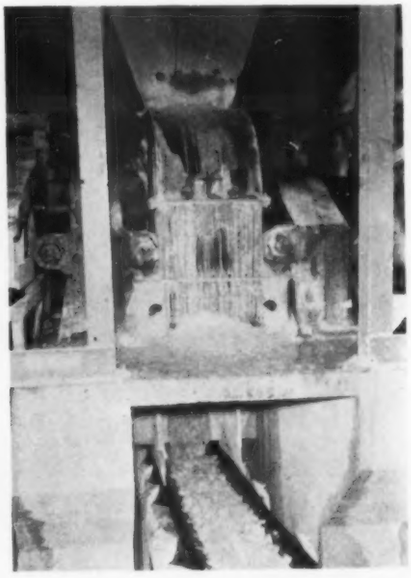
THE largest and most modern new crushed-stone plant built in the South in many years is operated by the Camp Concrete Rock Company, near Brooksville, Florida. The latest in equipment is used throughout the entire operation, which is unusually flexible for a straight-line plant. A feature is an unusual storage system which has a capacity of 150,000 tons. The plant has a capacity of 200 tons per hour of salable material, about the same as that of the old plant which it replaced. A 1¾-mile spur track and a 5-mile road were built by the company to give access to the property, which is actually located in the wilderness.

The name Camp is a familiar one in Florida industrial circles, having been prominent in the industrial development of the state since 1890. In that year two brothers, Clarence and the late Jack Camp, moved to Florida from Virginia where they had been in the lumber business. The Camp Phosphate Company was formed for the production of Florida hard-rock phosphate. In 1908 the brothers entered the hard-rock phosphate field under the name of C. & J. Camp. Late in 1924 the Camp Concrete Rock Company was formed and a crushed-stone plant was built at Camp, 7 miles northeast of Brooksville. This was enlarged and improved from time to time and was dismantled when the new plant went into operation in February, 1939, at a new site at Gay, 4 miles northwest of Brooksville.

The general design of the plant and of much or the equipment used in it is credited to Jack Camp, who, as president of this company, took a great personal interest in operation and production problems. Although Mr. Camp unfortunately never saw this plant in operation, he would have been pleased with the manner in which his ideas were carried out. The plant presents an appearance which would inspire any purchaser of its products with confidence in their quality.

All the buildings are of all-steel-and-concrete construction with corrugated-metal roofing and siding. The only wood used is in the floors and stairways. The greatest tribute to the design of

The tipple and inclines from the pits.



Roll-crusher which reduces to minus 4 inches.

this plant is the fact that it has done all that it was designed for and that was expected of it.

The 100-acre deposit consists of a hard crystalline limestone, in the form of bowlders and nuggets, embedded in soft lime rock. The recoverable rock forms about 60 per cent. of the matrix. The overburden varies from 2 to 10 feet in depth and this is removed by drag-lines and trucks after the timber has been cut and the stumps have been pulled. The equipment used for stripping includes a 3-cubic yard Bucyrus-Erie 80-B electric drag-line, a 30-B Bucyrus-Erie electric drag-line and a 1½-cubic yard P & H drag-line.

The new electric shovel loading car in pit.

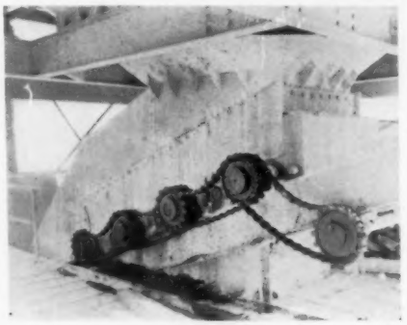
Two separate pits are now being worked, each with a 35- to 50-foot face. Drilling is done with two Keystone electric well drills. The holes are first sprung with dynamite before the shot is made with black powder. Both pits are operated in the same manner. In one the loading is done by a new Marion 480 electric shovel with a 1¾-cubic yard dipper and Ward-Leonard control. In the other pit a Bucyrus-Erie 50-B steam shovel with a 1½-cubic yard dipper is used. Each pit has a separate double-track incline to the tipple. These inclines are at an angle of about 90 degrees to each other. Four 7-cubic yard end-dump cars are hauled up these inclines and dumped from the four tracks on two sides of the 24-foot square hopper over the primary crusher.

Each of the pit tracks is now about 900 feet long. After each of the present tracks has been extended to a length of 1,200 feet a transfer hopper will be built at the end of each pair of tracks. A pendulum track will then be extended from each of these hoppers and moved in an arc about the hopper. Cars will then be loaded on the pendulum tracks and hauled by a hoist up an incline to the transfer hoppers, from which the material will be discharged into cars for transportation to the plant.

The revolving washing screen with blade-mill at right and vibrating screen below.

The main inclines to the plant are earth and rock fills above ground to within 50 feet of the plant. This part of each incline is built of steel supported on concrete-capped piling. The two incline hoists are located at ground level about 50 feet beyond the tipple and in line with the inclines. Each hoist has two 48-inch drums for two tracks and is driven by a 100-horsepower motor. The cables run on pulleys over the top of the tipple. The hoist controls are operated by cables from a tower at the top of the tipple, where the operator has a clear view of the pits, inclines, crusher and plant.

Material is withdrawn from the hopper on a Robins live-roll grizzly which also serves as a feeder. Friction controls operated through a lever are used to stop the grizzly when a car is dumped and to vary the rate of feed as necessary. The plus 8-inch material passing over the grizzly is discharged into the 36- by 60-inch Allis-Chalmers Fairmount single slugger-roll primary crusher.



The live-roll grizzly under the plant hopper which also feeds the primary crusher.

The minus 8-inch product of this crusher, with the minus 8-inch material which has gone through the grizzly, is discharged into an 8-foot diameter by 14-foot 8-inch Allis-Chalmers blade-mill or revolving scrubber. The mud, clay, soft lime, etc., are broken up in this scrubber and most of them overflow with the wash-water. The product of the scrubber is discharged into an Allis-Chalmers 7-foot diameter revolving screen equipped with washing sprays and 2½-inch-perforated screen plate. The material passing through this screen is discharged on a 4- by 10-foot Allis-Chalmers Low Head screen which has ¼- by ½-inch wire cloth on its single deck. Material retained on the vibrating screen is discharged, ahead of that retained by the revolving screen, on a 30-inch by 161-foot inclined belt-conveyor, running to the second unit of the plant. Waste material and

The live-roll grizzly which feeds fine stone to log-washers and coarse rock to picking table.

water overflowing the blade-mill and passing through the vibrating screen flow into a concrete sump. A 10-inch Georgia centrifugal pump, driven by a 200-horsepower motor, removes it to a waste pond.

The above-mentioned conveyor discharges the material on a Robins live-roll grizzly with 2½-inch openings. Material passing through the grizzly goes through a divided chute into two 20-foot double log-washers. Following these is a 4-foot by 10-foot Allis-Chalmers single-deck dewatering screen. Waste and water from both washers and the screen flow to the sump. The material retained on this screen is carried on a 30-inch by 122-foot belt-conveyor to the third unit of the plant. The material passing over this grizzly goes on a 48-inch by 14½-foot picking belt-conveyor, where any clay balls or other objectionable materials remaining are removed. The rock is discharged into a 24- by 54-inch Allis-Chalmers Anaconda double-roll crusher with fluted rolls. This reduces the rock to 4 inches and under and its product drops on the belt-conveyor on the top of the finer material from the log-washers.

This conveyor discharges the stone into a 48- by 20-inch Allis-Chalmers Superior 2-roll crusher which reduces it to the maximum size desired, which may be anywhere from 1 to 2½ inches. A 24-inch by 72-foot belt-conveyor carries the crusher product to a 6- by 13-foot Allis-Chalmers Low Head single-deck screen. Openings on this screen are varied from 1 inch up to 2½ inches, depending on the demand, and the material passing through it is finished product. The material retained on this screen goes to another 48- by 20-inch Superior 2-roll crusher which reduces it to screen size. These two materials are discharged on a 30-inch by 172-foot belt-conveyor running to the final-screening and storage building.

Rock is discharged from this belt-conveyor through a split hopper into a pair of 4- by 12-foot Allis-Chalmers Low Head 2-deck vibrating screens. Materials retained on the two decks are finished sizes and drop into bins. Materials passing through the bottom screen decks are carried on blank plate decks to a pair of 5- by 14-foot Allis-Chalmers special Low Head 2-deck screens. These make two smaller sizes of stone which also drop into bins. These last two machines are Low Head screens built in reverse with the drive at the bottom instead of at the top so that they discharge at the highest possible elevation. Plate decks under these screens feed a 4- by 12-foot Allis-Chalmers Low Head 2-deck screen which makes the two smallest sizes of stone desired. The minus 1/16-inch screenings passing through the bottom deck of this screen are stored separately and are sold as agricultural limestone. Water and waste from the screens in this building flow to a sump from which they are removed by a 6-inch Maddox centrifugal pump.

A close-up view of the 36- by 60-inch primary roll-crusher.

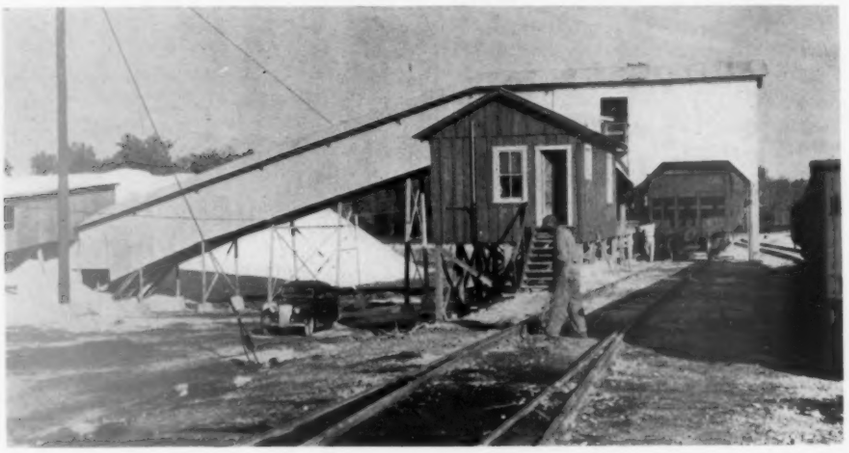
Single-deck screen from which oversize goes to the final reduction crusher.

Each of the six circular concrete bins or silos under the screening building holds 40 tons. Under each of the three rows of bins is a loading track, which splits into two tracks, each with its separate incline for stock-piling. Under each row a 4-ton bull car is loaded and hoisted up one of the inclines. The six inclines radiating from the bins are from 300 to 500 feet long and are 50 feet high at their discharge points. The four coarse sizes are discharged into stock-piles over a 500-foot concrete reclaiming tunnel. It is estimated that 40,000 tons of stone can be piled over this tunnel, of which 18,000 tons is live storage, through the three tunnel openings under each of the four piles.

A drag-scraper system is used to build up a total storage of about 150,000 tons of these four sizes of material and to reclaim them. The 1½-cubic yard scraper bucket is operated from a 40-foot movable head tower operating on two standard-gage tracks spaced 12

Looking down from tipple at blade-mill on revolving and vibrating screens.

View from one of the pit inclines showing most of the plant, stock-piling system, and the water tank.



Tunnel-conveyor car-loading structure. Plant office in foreground.

feet apart. The head tower is self-propelling and also houses the 100-horsepower scraper hoist. The tower is held in place when in operation by rail clamps. The tail end of the scraper system can be fastened at any of four points to a cable paralleling the tunnel.

Stone is reclaimed through tunnel openings from which any one size or combination of sizes can be discharged

One of the two sets of dual log-washers used in this plant.

on a 24-inch by 1,028-foot belt-conveyor. This conveyor operates at a speed of 300 feet per minute and discharges on a rotary screen where the dust is rinsed off. The stone is loaded into cars for shipment through an automatic swinging chute which prevents segregation.

The No. 6 stone is discharged from a trestle to a pile, from which a crane can load it direct to cars. It can also be fed to a hopper from which a belt-conveyor feeds it to the tunnel belt-conveyor for blending with the four coarser products.

The No. 16 stone is discharged from its trestle on a pile near the loading track for crane loading into cars. This trestle has been extended to a length of 500 feet so that it can be used to pile railway ballast on the opposite side of the loading track.

The six stock-piling systems are driven over sheaves at their discharge ends from hoists on the ground below. The hoists for the four trestles over the reclaiming tunnel are driven from a lineshaft driven by a 100-horsepower motor. The other two systems are similarly driven drom hoists driven through a lineshaft by a 50-horsepower motor. These hoists are operated through levers and cables by men under the loading bins who also operate the car-loading gates.

The wash-water used in this plant is supplied from three deep wells. A Layne & Bowler 2,500-gallon per minute pump supplies water for the blade-mill and the conical screen. A Worthington 2,500-gallon per minute pump serves the log-washer and the sizing screens. A 500-gallon per minute Layne & Bowler pump supplies water for the rinsing screen and also for a 16,000-gallon steel tank which is painted aluminum color and adds considerably to the appearance of the plant. The water from the latter system is also used for fire protection.

One of the 1,500-gallon per minute deep-well pumps which supply wash-water.

Power is purchased from the Florida Power Corporation and is reduced at a substation to 2,300, 440 and 220 volts. Most of the motors in the plant use 2,300-volt current. Most of the motors and electrical equipment were supplied by the General Electric Company. The Allis-Chalmers Manufacturing Company supplied most of the equipment in this plant including the vibrating screens which are driven through Texrope. The belt-conveyors are driven through Falk speed-reducers and chain by Allis-Chalmers motors. The Fairmount primary roll-crusher, the Anaconda roll-crusher, the first Superior roll and the final Superior roll are all driven through flat belts by General Electric motors of 150-, 150-, 125- and 100-horsepower respectively. The log-washers are belt-driven from a lineshaft by a 100-horsepower motor. The blade-mill is driven through reduction gears by a 150-horsepower motor.

Car from pit in background dumping its load into plant hopper.

Goodyear conveyor belting is used throughout the plant and all the conveyor idlers and pulleys were supplied by the Stephens-Adamson Manufacturing Company.

Perforated-metal screen plate made by the Chicago Perforating Company is used on all the screens.

For its employees the company has built 29 houses which are equipped with all modern conveniences. There is also a modern machine and repair shop where practically all repairs can be made.

Henry N. Camp, son of the late Jack Camp, has active charge of operations and is secretary and treasurer of the company. Clarence Camp is president, and E. F. Fitch and Clarence Camp II are vice-presidents. J. E. Godwin is plant superintendent.

MAINE FELDSPAR PLANT HAS DOUBLED CAPACITY TWICE SINCE STARTING

A FELDSPAR plant which has been modernized to keep up with changing conditions is operated at West Paris, Maine, by the United Feldspar & Minerals Corporation. When built in 1924 by the Oxford Mining & Milling Company, it was the only Feldspar plant in western Maine and had a capacity of one 40-ton car daily. In 1929 this company was consolidated with the U. S. Feldspar Corporation and the Tennessee Mineral Products Company to form the United Feldspar Corporation, of which all were subsidiaries, along with the more-recently-formed Carolina Pyrophyllite Corporation, until January 1, when the United Feldspar Corporation took over the subsidiaries and became the United Feldspar & Minerals Corporation.

In 1935 the capacity of the grinding plant was doubled by the installation of a second Hardinge conical mill. A rebuilding and extension program completed in March, 1938 again doubled capacity which is now four cars daily.

This latest program involved the addition of a concentrating plant employing magnetic separation for the production of a very pure spar of low iron content from the lower grades of spars. This department was also designed to process nepheline syenite shipped in from deposits near Peterboro, Ontario, Canada. This material now forms about half the output of the plant. This is also one of the few plants producing pollucite, which is used in the manufacture of photoëlectric cells and television tubes. Pure beryl is also found and this is either ground or sold in crude form.

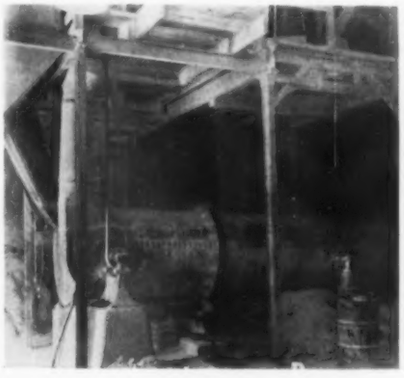
Most of the feldspar is crystalline and comes from what are said to be the only such deposits in this country east of the Mississippi River. The largest producer of No. 1 crystal spar, used in the manufacture of china, porcelain and high-grade enamels, is the Newry mine 35 miles north of the plant. This mine is on a steep mountain-side about a mile from a highway. A Caterpillar Diesel tractor hauls the crude spar to the highway in 4-ton stone boats with 2 wheels in front and none behind.

Another high-grade deposit even farther from a highway was recently opened near Gilead near the New Hampshire border in the White Mountain National Forest. The same haulage methods are used here.

Lower grades of feldspar are obtained from more accessible deposits ranging from 2 to 35 miles from the plant. The same methods of mining are employed in all these mines. Drilling is done with jackhammers for which air is supplied by portable compressors. Ordinary steel drills were used up to a few years ago and these were sharpened at a central blacksmith shop. The Timken detachable bits now used have eliminated the hauling problem and made the shop unnecessary.

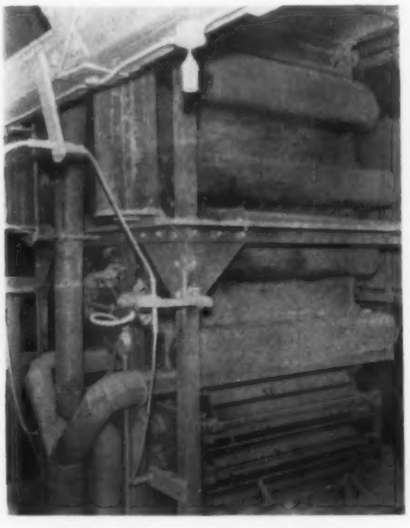
Two of the four magnetic separators.

Raw spar is loaded by hand into steel buckets which are brought to the surface by gasoline hoists. Guy derricks are used to dump the raw spar into bins or into trucks for direct haulage to the plant, as the case may be.



The 4- by 30-foot rotary drier with fan to cyclone.

General view of the plant with storage sheds and office at right.



Vertical drier of company design.

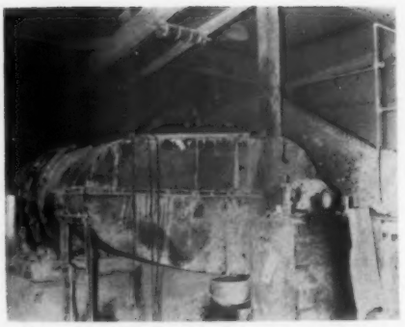
All raw materials received are weighed before they are dumped into nine ground-level storage bins with a combined capacity of 2,700 tons. Pneumatic-tired wheelbarrows are used to feed these materials to a 10- by 18-inch Reliance jaw crusher. An elevator feeds the crusher product into a 4- by 30-foot Hardinge Ruggles-Coles rotary drier direct-fired with coke. The dried spar is elevated to a 2-foot Symons cone crusher which reduces it to ¼-inch minus. This material is then elevated to a pair of Tyler Hum-mer screens.

Up to this point all the material processed follows the same flow. Following these screens, however, are two processing flows. The regular run of spar and the nepheline syenite are processed in the new magnetic concentrating department. Hand-picked spar goes to the old department. Products of both departments have an average iron content of only .07 per cent.

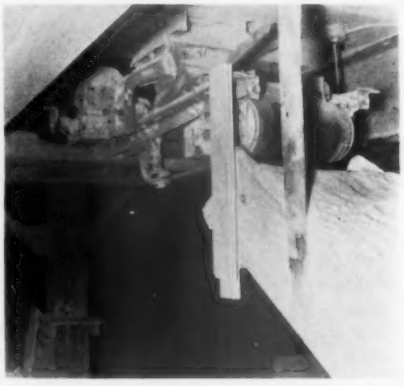
The latter flow begins at five bins fed from the above-mentioned screens. Jeffrey-Traylor electric vibrating feeders discharge the material from these bins to a pair of 8-foot by 48-inch Hardinge conical mills. Silex lining and Danish pebbles are used in the mills. The mill product is elevated to a 14-foot Gayco mechanical classifier where the desired mesh is classified and the oversize is returned to the mills for regrinding. Fineness tests are made at regular intervals to insure absolute uniformity. The finished product can be loaded in bulk through chutes into box-cars. It can also be fed to a Bates 1-spout bagger for loading into 100-pound valve bags.

In the other flow material from the Hum-mer screens by-passes the bins to a belt-conveyor feeding another pair of Hum-mer screens. The oversize material from these goes to 3 Sturtevant rolls and returns to the screens. The minus 20-mesh material passing through these screens goes into three 50-ton steel tanks.

Jeffrey-Traylor electric vibrating feeders discharge from the tanks into four Dings high-intensity induction-rotor magnetic separators, which remove deleterious iron-bearing minerals —garnet, hornblende, tourmaline, mica, etc.—and any other materials with as little as 4 per cent. of Fe_2O_3, such as muscovite mica.



One of the two conical grinding mills with silent-chain drive in foreground.



Four constant-weight feeders, one pictured here, blend from bins to loading belt.

Tractor-drawn stone boat which hauls the feldspar from one of the mines.

Chief Chemist Finks and Manager J. H. Weis.

The concentrates from the magnetic separators are almost entirely free of these impurities. Chemical analyses and fusion tests in high-temperature gasoline and electric furnaces are made regularly to insure a high-grade product. Samples are taken by means of an automatic sampler. The concentrates are elevated into one of the four 100-ton blending bins. After tests have been made on the material going into these bins proportions are figured out to make a desired blend from them. The actual blending is done by means of Hardinge constant-weight feeders under the bins. The blended product is carried on a belt-conveyor feeding a Stephens-Adamson Sinden box-car loader.

When a finer product is desired, the concentrates of the magnetic separators, minus 20-mesh material, can be carried on a belt-convyeor to two of the five bins feeding the Hardinge mills. This product can be loaded into cars in bulk or packed into bags.

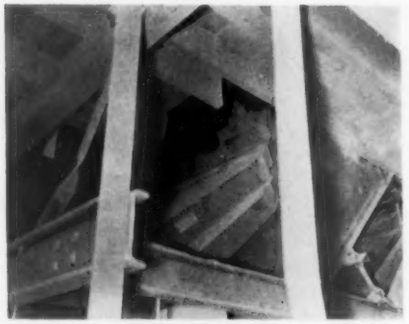
Both the old and the new departments are of fireproof construction with concrete foundations, steel framework and corrugated-metal roofing and siding.

In the new department all the elevators were supplied by the Link-Belt Company and are driven by G. E.-Link-Belt motor reducers. Jeffrey-Timken belt-conveyors and Goodyear conveyor belting are used.

The plant is located on a branch of the Canadian National Railway which runs from Portland, Maine to Montreal. Shipments are made to all parts of the country.

J. H. Weis is plant manager and Charles E. Finks is in charges of the completely-equipped chemical control laboratory. F. E. Haag is president of the United Feldspar & Minerals Corporation, Robert F. Sherwood is vice-president, and H. H. Reiss is secretary-treasurer.

One of the roll-crushers used for reducing screen oversize.



Partial view of some of the electric vibrating screens.

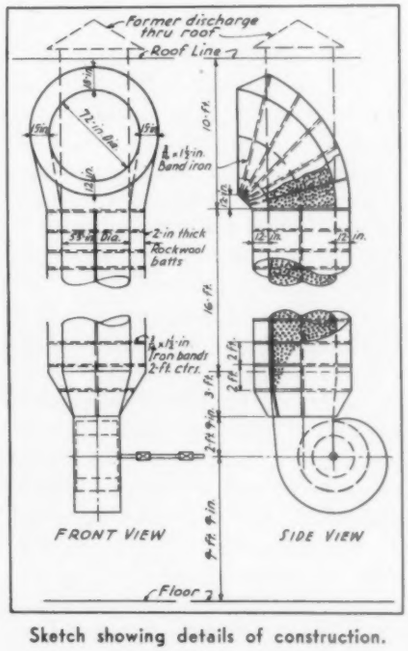
Silencing An Exhaust Fan

A large, high-speed exhaust fan, operating a dust-collector in a northern New York State mill, created excessive noise. As originally installed, the exhaust was carried through a 55-inch diameter stack, rising vertically through the roof of the building. The discharge of 40,000 cubic feet of air per minute produced a roar that could be heard well over a mile away. Since the plant was located near a residential section, the condition could not be tolerated.

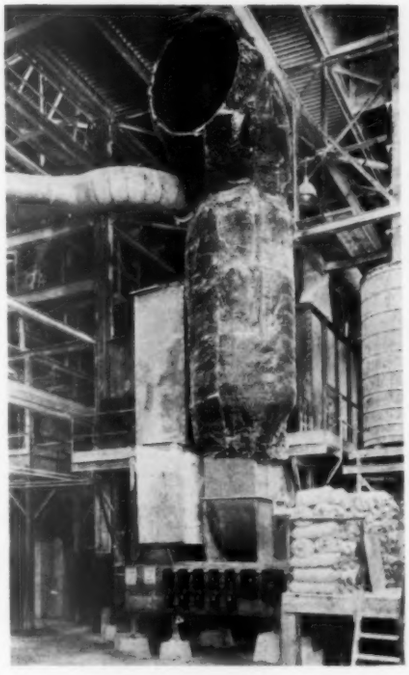
A change in the speed of the fan was not permissible, and to install a substitute slower-speed unit would have been too costly. As a temporary expedient, the stack was removed and a large square chamber, lined with a substantial but porous wood-fiber board, was built in its place. The air was discharged through this inside the building. Much of the roar was eliminated by this confinement, but the condition was still highly unsatisfactory.

After some consideration an old principle of silencing was brought into play. The original stack was still on hand, so a 16-foot section was taken and cut full of 2-inch holes. Electric drills and hole saws were used to do this, and a crew of men cut nearly 2,400 holes in two and one-half days. The holes were staggered and spaced so that at least 2 inches of metal was left between them.

To divert the exhaust away from the roof a cowl-type elbow, tapering from 55 inches at its small diameter to 6 feet at its large, was built, and it, too, was punched with holes as was the straight section. A series of band-iron hoops, 2 feet larger than the stack diameter, were welded on supporting brackets around the straight section. A similar series of radial hoops were placed around the cowl, but they were given a clearance of 15 to 18 inches on the sides and back.



Sketch showing details of construction.



The silencer as installed.

Batts of 2-inch rock wool, 15 inches wide and 9 feet long, were bound into blankets, using ¾-inch mesh chicken wire on the exposed wool side and 2-inch mesh on the paper side. These blankets were then wired to the band-iron supports, wool side in, so as to surround the pipe, except for the actual exhaust opening. A substantial job was done to prevent the blankets from flapping and so dislodging the wool fibers.

When the complete outfit was finally installed, the noise level was enormously reduced, and the result has been entirely satisfactory. Readings with a decibel meter demonstrated that the actual drop in sound energy was about 75 per cent. This means that to the ear the sound was only about half as loud.

The efficiency of the unit was not noticeably affected nor has there been any scouring or damage to the surface of the rock wool. Pressure tests made in the area between the straight stack and the wool blanket showed a maximum variation on either side of atmospheric of only ⅛ inch of water. Because the cowl was not easily accessible, no attempt was made to measure the pressure in the upper part of the elbow.

The accompanying sketch and photograph show the manner and details of construction. The total cost, including the band iron, rock wool, wire and labor, but not the stack or elbow, was less than $125.

What Is The Best Drilling Speed?

The wide use of churn drills by quarries raises questions regarding the best speed of drilling for maximum results, the effect of speed on rope replacement, and means for increasing the life of drilling rope.

The ideal drilling speed with drills of this type is 54 to 56 strokes per minute, reports F. W. Greer, general superintendent, the Consumers Company, Chicago. This company uses a great number of churn drills for drilling blast holes and has kept a careful check on their operation. These holes are 30 to 60 feet in depth. Slower or higher speeds result in less footage, according to the experience of this operator.

At higher speeds the operation becomes jerky, which is destructive of the rope. Some operators will attempt to obtain smooth operation at high speeds by holding the rope slightly taut as the bit falls, but in doing so they do not allow the bit to utilize its full capacity for penetration, and, hence, the footage is reduced.

The jerk that occurs when the tool is picked up is very severe on the cable, and results in high stresses and vibration, which cause fatigue breaks in the cable wires. In view of the ability of preformed rope to resist fatigue more successfully than non-preformed, one large company has replaced all the ropes on its spud drillers with preformed rope, and reports that much longer life is being obtained.

The manufacturers of drilling machines themselves are attempting to solve the problem of short cable life by various ingenious methods aimed at easing the shock when the tool is picked up. One manufacturer is using a compression spring to back up the sheave at the boom point, and a tension spring at the spudder sheave. Another is employing pneumatic cushioning devices at the sheaves. A third manufacturer recently introduced a machine with sheaves having rubber-lined grooves and a rubber insert in the bearing.

Gratifying success has attended all these attempts at eliminating shocks in the cable, but experimentation is still continuing. *(F. L. Spangler, M.E.)*

PERSONAL MENTION

T. D. HENSHAW has been elected secretary of the Riverside Cement Company, Los Angeles. He succeeds WILLIAM H. METCALF who is on an extended leave of absence.

GEORGE KILIAN, secretary and treasurer of the Pennsylvania-Dixie Cement Corporation has been elected a director to succeed WALTER S. WING, resigned.

U. B. LEE, contractor of San Leandro, California, has purchased the San Leandro Rock Company. New equipment is now being installed.

DEVON DICKERHOOF is installing equipment for the manufacture of concrete blocks at North Manchester, Indiana.

W. C. SWALLEY has been made assistant general sales manager of the Wellman Engineering Company, Cleveland.

L. E. COLE has been appointed sales representative for Diamond Iron Works, Inc., of Minneapolis, covering Washington, Oregon, Idaho, Montana, Wyoming, Colorado, Utah, Nevada, California, and Alaska. His headquarters will be at Boise.

HOWARD R. STARKE, personnel manager and assistant to Vice-President Earle MacDonald, Riverside Cement Company, has been named general superintendent of the company's Crestmore, California plant. Mr. Starke has been connected with the company since his graduation from California Institute of Technology in 1927.

HAROLD HUDSON, a farmer living near Sylvania, Ohio, has sued the Medusa Portland Cement Company for $10,000, alleging that dust from the company's cement plant damaged his crops to that extent last year.

HARRY HOLLEY has been appointed sales manager of the block department of Concrete Products & Materials Company, Omaha.

B. P. JOHN has purchased the plant of the Oregon Lime Products Company at Williams, Oregon. Mr. John is a resident of Portland.

MELVIN H. BAKER, president of the National Gypsum Company and president of the Buffalo Chamber of Commerce, presided at the opening banquet of the annual Buffalo Clean-Up, Paint-Up campaign in the Hotel Buffalo on May 6.

W. D. TURNBULL, associated with the Westinghouse Electric & Manufacturing Company for the past 17 years, has been made general sales manager of the Pomona Pump Company and is in charge of the newly-opened New York City office. C. L. BARRETT, formerly general sales manager, has been promoted to vice-president in charge of sales.

Z. G. BUNCH of Hunting, West Virginia has formed the Seven Mile Sand & Gravel Company and erected a small plant. About $5,000 has been invested in equipment and structures.

CHESTER H. LANG, manager of General Electric's advertising and sales promotion activities since 1932, has been named manager of apparatus sales and vice-chairman of the company's apparatus-sales committee. The apparatus or capital-goods lines range from big turbines to tiny motors.

THOMAS E. COCKER has been appointed manager of the Detroit district office of Chain Belt Company of Milwaukee. He succeeds G. A. GUNTHER. Mr. Cocker, who is a graduate of Rensselaer Polytechnic Institute, has been with the company since 1921 and has served as district manager of both the Cleveland and Buffalo offices. Mr. Klemme will succeed Mr. Cocker as manager of the Buffalo district office.

CHARLES A. SPEARS has resigned his position in the Caterpillar Tractor Company sales department to become director of sales development for one of the company's allied manufacturers, the LaPlant-Choate Manufacturing Company, Inc., of Cedar Rapids, Iowa.

WILLIAM M. HOLM, 54, assistant sales manager of the Yosemite Portland Cement Company, suffered a heart attack while driving his automobile in Oakland, California, recently and died a short time later in a hospital. He was formerly connected with the Portland Cement Association.

H. H. ROBERTSON, superintendent of the Roscoe plant of the Consolidated Rock Products Company, Los Angeles, was instantly killed in a fall a short time ago.

JAMES A. ROCKWELL, 64, vice-president of the Ash Grove Lime & Portland Cement Company, died recently at a hospital in Omaha, after he was stricken with a heart attack in his office. He was born in Missouri Valley, Iowa, went to Omaha in 1890. He joined the Ash Grove company 11 years ago. A wife and son survive.

FRANK J. GRUTSCH, 65, vice-president and treasurer of the Concrete Products Manufacturing Company of Brentwood, St. Louis suburb, died recently after an illness of several weeks. He formerly resided in Minneapolis.

W. L. WHITAKER, 72, one of the founders of the Oklahoma Portland Cement Company, died at his home in Ada, Oklahoma, in April. He had lived in Ada, where the cement plant is located, for 33 years.

OCCUPATIONAL DISEASES AND THE LAW

Safe Place to Work

Nashville Bridge Company v. Hudgins, decided by the Court of Appeals of Tennessee, Middle Section, December 17, 1938, certiorari denied by Supreme Court, April 1, 1939; reported at 137 S.W. (2d) 327 (April 2, 1940).

The appellee in this action won a judgment against his former employer, in a suit at common law to recover damages for personal injuries resulting from the inhalation of particles of paint containing lead, on the ground that the employer failed to provide a reasonably safe place in which to work. The appellate court holds that the facts established that the place where the painting was done was not equipped with fans which should have been provided, and that it was not improper for the jury to find that this failure constituted a breach of duty.

It was insisted by the employer that lead poisoning is an occupational disease for which an employer is not responsible (in Tennessee) even though it failed to provide a reasonably safe place in which to work. This argument is answered by the ruling (citing *Connell v. Fisher Body Corporation,* 56 Ga. App. 203, 192 S.E. 484, 486) that "it is just as much the duty of a master to use reasonable care to protect his servants against the dangers of em-

ployment which may reasonably be expected to produce disease as it is to use reasonable care to protect his servants against dangers of the employment which may produce physical injuries."

As to the defense of assumption of risk and contributory negligence, the court holds that a jury question was presented. "Unless the employee knows that the assurance of safety is not based upon knowledge of the employer, he does not assume the risk even though their knowledge may be actually the same *(Grey Eagle Marble Company v. Perry,* 138 Tenn. 231, 197 S.W. 674) unless 'the danger was so glaring that a man of ordinary prudence would not have continued to work'; the assurance, in such a case, being equivalent to a statement to the servant that the master has a knowledge of the matter superior to that of the servant, and that the latter can rely upon the information given."

While upholding the decision of the court below on the essential points of fact and law, the appellate court reverses the judgment on account of an incorrect charge to the jury, and remands it for a new trial.

Uncompensable Disease

Pace, Rainer & Pace et al v. Robertson et al., decided by the Supreme Court of Oklahoma, September 26, 1939, rehearing denied January 23, 1940; reported at 98 Pac (2d) 46.

The workman (respondent) in this case obtained an award of workmen's compensation for injuries to his arms and hands due to poisoning from oil and cement. That award was contested, and in this appeal is vacated on the ground that the claimant's injury was not due to accident (in which case it would be compensable) but to an occupational disease known as "oil dermatitis" produced by repeated contacts with crude petroleum. Occupational diseases are not compensable under the Oklahoma Workmen's Compensation Act *(Imperial Refining Company v. Buck,* 1932, 155 Okl. 25, 7 Pac. (2d) 908). The court finds no evidence of an accidental injury compensable under the act, and that the workman was suffering from an occupational disease as claimed.

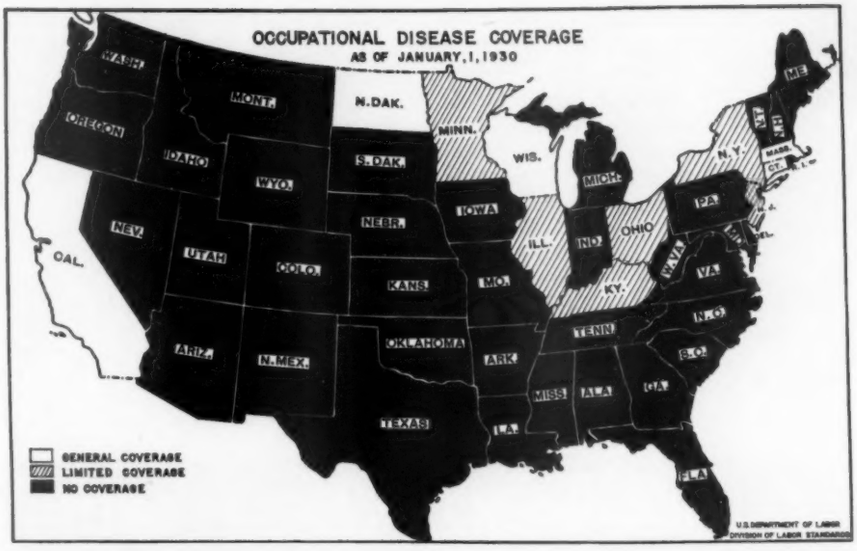
Constitutionality

Liberty Foundries Company v. Industrial Commission et al., decided by the Supreme Court of Illinois, February 21, 1940; reported at 25 N.E. (2d) 790.

This case reached the Supreme Court to review a decision of the Circuit Court of Winnebago County holding the Illinois Workmen's Occupational Diseases Act unconstitutional and setting aside an award of compensation to a foundry worker who was found to be disabled from silicosis.

The constitutional objections were directed against Section 25 of the act. That section provides that an employee shall conclusively be deemed to have been exposed to the hazards of an occupational disease when, for any length of time, however short, he is employed in an occupation or process in which the hazard of the disease exists. It further provides that the employer liable to pay compensation is the one in whose employment the employee was last exposed to the hazards of the disease for which compensation is claimed, regardless of the length of time of such exposure. There is a proviso as to silicosis and asbestosis that, in those cases the only employer liable is the last employer, in whose employment the employee was last exposed to the hazards, during a period of 60 days or more after the effective date of the act.

It was contended that Section 25 establishes a liability upon the last employer, based solely upon the fact of exposure to the hazards of the disease, and that the statute declares such exposure shall be conclusively deemed to exist whenever it appears that the employee has, during his employment, been exposed to the hazards of the dis-



These maps show the growth of occupational-disease legislation in ten years. In 1930 two states, North Dakota and Wisconsin, provided workmen's compensation for all occupational diseases (general coverage); now there are eight, California, Illinois, Indiana, Missouri, New York and Ohio having joined the other two. Ten years ago only five states, Illinois, Kentucky, Minnesota, New York and Ohio, provided compensation for specified occupational diseases (limited coverage); in 1940 there are eleven in addition to Illinois and Ohio, which have joined the full-coverage group. The states shown in black provide no compensation for occupational diseases.

ease for which he seeks compensation. This, it was claimed, is a legislative encroachment on the powers of the judiciary. The Supreme Court rules, however, that the main fact at issue in an action under this act is one of liability, and that Section 25 does not make liability to pay dependent only upon the fact of exposure. "An employee, in the course of his employment, may come in contact with conditions which are deemed to be hazards of the disease for which he seeks compensation, and, under Section 25, the exposure to such hazards is conclusively presumed. Such presumption, however, does not establish liability, nor does it excuse the employee from proving the elements necessary to show the occupational disease is traceable to the hazards of the employment as is required by Section 6. . . . Under the latter section the evidence must show the employee has contracted a disease which is fairly traceable to the hazards of the employment with the employer from whom the compensation is claimed, and that such hazards are fairly traceable as the proximate cause of the disease."

That contention of unconstitutionality was, accordingly, overruled.

It was also contended that the compensation provisions of the act violate the due-process clauses in state and Federal constitutions; the answer to this, says the Supreme Court, is found in the elective features of the act, "When the employer and the employee elect to come within the provisions of the compensation sections, such sections become a part of the contract of employment and, as between the parties, are enforceable as such."

Certain questions of fact are decided in favor of the claimant; the judgment of the lower court is reversed and the award of the Industrial Commission is affirmed.

Aggravation of Silicosis

Leonard v. Fisher Body Company, St. Louis Division of General Motors Corporation, decided by the St. Louis (Missouri) Court of Appeals, March 5, 1940; rehearsing denied March 19, 1940; reported at 137 S.W. (2d) 604.

The workman involved in this case was a metal finisher and, according to the evidence presented, worked in an atmosphere containing silica and silicate dust. The Workmen's Compensation Commission awarded compensation for permanent total disability, finding that his employment with the defendant company aggravated a dormant case of silicosis, resulting in silicotuberculosis. The Court of Appeals, affirming an earlier judgment of the Circuit Court, holds that the evidence supports that finding of facts.

The court also rules, following *Renfro v. Pittsburgh Plate Glass Co.,* 130 S.W. (2d) 165, 171, that the statute of limitations provided for in the Compensation Act does not begin to run until it becomes reasonably discoverable and apparent that a compensable injury has been sustained, and that the time of "injury" in an occupational disease case is that time when the disease causes a compensable disability.

MARMON-HERRINGTON "HEAVY DUTY"
All-Wheel-Drive TRUCKS

TRACTION and POWER Unexcelled
by anything on wheels . . .
ON THE HIGHWAY AND OFF

★ There are plenty of reasons why owners and operators of the largest most powerful two-wheel drive trucks (yes, and other multiple drive trucks too) are rapidly replacing these vehicles with Marmon-Herrington Heavy Duty *All-Wheel-Drives.*

Any multiple drive vehicle has a tremendous advantage over a two-wheel drive vehicle in extremely bad going. But MARMON-HERRINGTONS have advantages *over other multiple drive trucks too,* for operation "cross country" or on paved roads.

First of all, there's the greater ease of steering—and the greater safety of driver and load in Marmon-Herrington constant velocity joint steering ends. No wheel "kick" or "fight" around curves or over the roughest kind of terrain. Then there's the forward placement of front wheels to prevent "rooting" in ditches or dips, and for better load balance. Drop frame construction provides greater stability on hills or level ground.

These are just a few of the many features of Marmon-Herrington *All-Wheel-Drive* superiority. Let us send literature on our complete line, which includes 33 Heavy Duty models and conversions of all standard Fords to *All-Wheel-Drive* in our plant. No obligation, of course. Cable Address MARTON, Indianapolis, Ind., U.S.A.

MARMON-HERRINGTON COMPANY, INC.
INDIANAPOLIS, INDIANA, U.S.A.

TRADE NOTES

The Denver Equipment Company has opened a Chicago office at 69 West Washington Street with John Henry Mohr in charge.

The Productive Equipment Corporation, Chicago, vibrating-screen manufacturer, has moved into new and larger quarters at 2926 West Lake Street.

The Allis-Chalmers Manufacturing Company has announced the appointment of Berrien Moore as manager of the Florida district, with headquarters at Tampa. Mr. Moore has been with Allis-Chalmers since 1908, when he joined the company as a hydraulic sales and textile engineer.

LABOR DECISIONS

Liquidated Damages

Moreno v. Picardy Mills, Inc., decided by the Municipal Court of New York, Borough of Brooklyn, First District, December 27, 1939; reported at 173 Misc. 528.

This is a suit under the Federal Fair Labor Standards Act of 1938 to recover twice the amount of pay the plaintiff was allegedly entitled to receive by reason of overtime work. The defendant claimed that the state courts do not have jurisdiction, on the ground that only the Federal courts have jurisdiction over suits for penalties under Federal laws.

In spite of the caption "Penalties" to Section 216 of the act, and reference to the doubled back wages in a Labor Department pamphlet under the head of "Penalties," the court (largely on authority of *Cox v. Lykes Brothers,* 237 N.Y. 376) holds that an action of this sort is not for a penalty, but for liquidated damages. It therefore holds that state courts have jurisdiction.

Boycott

United Electrical, Radio and Machine Workers of America v. International Brotherhood of Electrical Workers et al., decided by the U. S. District Court, Southern District of New York, January 15, 1940; reported at 30 Fed. Supp. 927. This was a suit by the plaintiff union against certain unions, union officials, installers, and a manufacturer of electrical equipment to enforce its rights under the National Labor Relations Act on the ground that the defendants were allegedly conspiring to boycott or threaten to boycott employees belonging to the plaintiff union. The court rules that the complaint charges an aggravated or severe case of deprivation on the part of the defendants of the right of collective bargaining guaranteed to employees and their duly accredited representatives by the National Labor Relations Act, and that the power to prevent any person from engaging in any unfair labor practice under the act is exclusively in the National Labor Relations Board (Section 10 (a) of the act); that the board has power to enforce its orders through the Circuit Court of Appeals, and that the plaintiff has not exhausted its remedies with the board. The complaint, therefore, is dismissed.

Reinstatement

Union Drawn Steel Company v. National Labor Relations Board, decided by the U. S. Circuit Court of Appeals, January 20, 1940; reported at 109 Fed. (2d) 587.

In this case the court finds ample evidence to support an order of the National Labor Relations Board requiring the company concerned to desist from domination of inside unions and from discouraging membership in outside unions. A further portion of the order required the company to reinstate with back pay two employees whom the board found to have been refused reemployment because of union activities; on this question, the court reverses the board because of a differing construction of the law and the facts.

In one instance the company assigned the foreman and other members of the stockroom force to do the work which had been done by the employee who was not rehired after a strike. Since "the right of the employer, for general economic reasons, to make use of a smaller staff to operate his business, to decrease his production, or to go out of business entirely if he desires to do so" is regarded as "indubitable,"

It is the latest development in transmission belt construction.

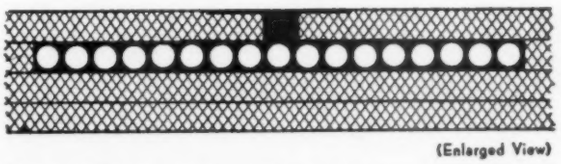
It has an insert of strong auto tire cords.

It has a new rubber that's tougher and has longer life . . . new tan color.

It gives you distinct transmission advantages.

Don't buy transmission belting until you've seen it . . . write or ask the "Cincinnati" man for samples.

THE CINCINNATI RUBBER MFG. COMPANY
CINCINNATI, OHIO



(Enlarged View)

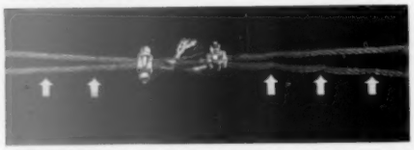
The Cord-Flex Band is inserted under the seam. It gains important advantages in efficiency, longer life and stronger adhesion.

A CINCINNATI TRANSMISSION BELT

Laughlin drop forged Safety Clips *grip* wire rope with a real he-man's clench, not the rope-crimping "finger pinch" you get with ordinary U-Bolt Clips.

Recent tests by one of the country's greatest engineering schools prove that Laughlin Safety Clips are over 50% more efficient!

Write for a free booklet which describes these amazing tests and shows how you profit in lower rope and clip costs by using Laughlin Safety Clips. It's free — use coupon. Mail it now.



SAVE ROPE. When ordinary U-Bolt Clips are removed, bent and crimped rope must be cut off — wasting rope. When Laughlin Safety Clips are removed, rope is straight and strong, ready for use again — no waste of rope.

FEWER CLIPS NEEDED. Here's another big saving. You use only three Laughlin Safety Clips to get the same strength you get with four ordinary U-Bolt Clips.

THE THOMAS LAUGHLIN CO.
Portland, Maine

Please send me free Safety Clip booklet. P-5

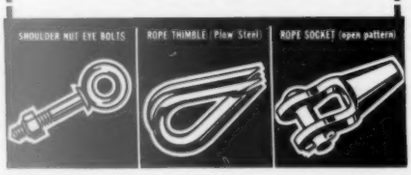
Name.....

Company.....

Address.....

Check here for catalog on items below ☐

Look for Laughlin products in Thomas' Register and buy through your distributor.



a majority of the court holds that there is no position open to which the employee can be reinstated. (One judge, dissenting, holds that the *motive* should be examined, and would require reinstatement of the employee in this instance.)

In case of the other employee the court finds that no position of the sort of work for which he applied is or was open, and that, consequently, the order of reinstatement should be reversed.

Union Activities

North Whittier Heights Citrus Association v. National Labor Relations Board, decided by the U. S. Circuit Court of Appeals, Ninth Circuit, January 12, 1940, rehearing denied February 7, 1940; reported at 109 Fed. (2d) 76. The National Labor Relations Board found the petitioning association guilty of unfair labor practices in discriminating against union members. The plant was shut down for an indefinite period, and when it was reopened about ten days later, most of the union workers were not recalled. The court sustains the board's finding that the shut-down was for causes inherent in the nature of the work (to await the ripening of a lemon crop) and that the employer-employee relationship was not disturbed thereby, and that the failure to recall union employees was a discrimination against them because of their union membership. The board's order that such employees be reinstated with back pay is, accordingly, affirmed.

The court also sustains the board in its findings that the packers in a fruit-packing plant are not agricultural laborers within the exemptions from the provisions of the National Labor Relations Act, and that the operations of the plant affected interstate commerce so as to give the board jurisdiction.

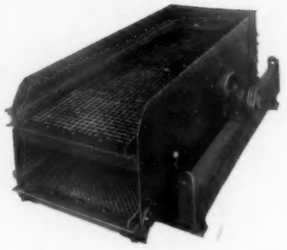
Review of Facts

National Labor Relations Board v. Waterman Steamship Corporation, decided by the United States Supreme Court, February 12, 1940; reported at 60 S.Ct. 493.

The U. S. Circuit Court of Appeals for the Fifth Circuit, upon petition of the respondent steamship corporation to set aside an order of the National Labor Relations Board, decided that the board's order was not supported by substantial evidence, said the order was based on mere suspicion, and declined to enforce it. Whether the court properly reached that conclusion was the single question before the Supreme Court.

The Supreme Court does not ordinarily review judgments based solely

SECO



—ACKNOWLEDGED LEADER IN THE VIBRATING SCREEN FIELD.

THE PATENTED DESIGN IS EXCLUSIVE AND DIFFERENT.

CATALOG SENT ON REQUEST.

SCREEN EQUIPMENT CO. INC.
9 LAFAYETTE AVE.
BUFFALO, N. Y.

OSGOOD

POWER SHOVELS
DRAGLINES
CRANES
TRUCK SHOVELS, Etc.
3/8 to 2½ Cu. Yds.

Write for New Catalogs

THE OSGOOD CO.
MARION OHIO

on questions of fact. In its petition, however, the board earnestly contended that the record before the Court of Appeals had presented clear and overwhelming proof that the steamship company had been guilty of a most flagrant mass discrimination against its employees in violation of the National Labor Relations Act, and that the court had unwarrantedly interfered with the exclusive jurisdiction granted the board by the Congress.

On a review of the record the Supreme Court concludes that all the board's findings, far from resting on mere suspicion, are supported by evidence which is substantial. "The Court of Appeals' failure to enforce the board's order resulted from the substitution of its judgment on disputed facts for the board's judgment, and power to do that has been denied the courts by Congress. Whether the court would reach the same conclusion as the board from the conflicting evidence is immaterial and the court's disagreement with the board could not warrant the disregard of the statutory division of authority set up by Congress." The appellate court's decision is reversed with directions to enforce the board's order in its entirety.

Employers' Association

Association of Plumbing and Heating Contractors of Greater New York, Inc., v. Merten, decided by the Municipal Court of the City of New York, Borough of Manhattan, First District, February 15, 1940; reported at 17 N.Y.S. (2d) 828.

The plaintiff in this case is an association of small independent plumbing contractors. During the year June, 1938 to May, 1939 the association had a contract with a union of journeymen plumbers covering various phases of employer-employee relationship between members of the association and the members of the union employed by them. Prior to the expiration of this contract the union gave notice that it would thereafter decline to deal with the association as the bargaining agent of the employers who were members. The association determined to resist the union on this question. By resolution, reduced to a written contract and signed by a large portion of the membership, the employers determined that no member should sign an individual agreement with the union, and for breach of that contract the signing members agreed to pay damages not exceeding $500. After the labor contract with the union expired the union struck against the association members. After the strike had continued for several weeks the defendant in this case,

A Worker and a Walker!

Page Draglines—Diesel or Electric Powered
3 1/2-cubic-yard capacity and larger

Edward E. Morgan Company used this Page Walker on levee work along the Wabash River near Vincennes, Indiana. The machine was shipped with a 125-foot boom and a 6-cubic-yard Page bucket.

Here is a dragline that really works for its owner—produces the high monthly yardage records contractors want.

Because of the two-shoe positive crank action walking mechanism and the large circular base, Page Walkers can move immediately in any direction—forward, backward, sidewise; permit better handling and quicker finishing of the job.

The high line speeds, the Page horizontal Diesel engine, the special rugged structure and machinery assure top yardage and minimum operating costs. Before buying any dragline, learn all about a Page high-yardage Walker for your work.

PAGE ENGINEERING COMPANY
Page Automatic Dragline Buckets · Page Walking Dragline Machines
CLEARING POST OFFICE, CHICAGO, ILLINOIS

LOW COST CRUSHING FOR 55 YEARS
GRUENDLER TWO-IN-ONE
LIMESTONE PULVERIZERS
Paying Big Dividends
Built to withstand severe punishment
- Heavy Duty Manganese Hammers
- Roller Bearings for 100% Overload
- Heavy Cast Steel or Sheltaloy Construction
- Adjustable Breaker Plate & Single Part Manganese Screen Bars
- Lowest Power and Maintenance
- Largest Capacity per H.P.

you can depend on
GRUENDLER EQUIPMENT
Write for Free 16-page Catalog and Specifications

Stationary or Portable
HAMMER CRUSHERS
Ideal for farm to market road work. Crushes stone to 1" minus down to agricultural lime dust.

Portable Unit with Bucket Elevator

GRUENDLER
CRUSHERS · PULVERIZERS · GRINDERS
GRUENDLER CRUSHER & PULVERIZER CO.
2915-21 N. Market St., St. Louis, Mo.

a member of the association, signed an individual agreement with the union, ending the strike. This court action was a suit by the association to collect the $500 damages which the association claimed from its member for violation of the contract.

The court observes that there are numerous industries where both employers and employees bargain through their respective associations by mutual consent, but in those cases both parties have voluntarily assented to the procedure adopted, whereas in this case the union demurs. Under the New York State Labor Relations Act, patterned after the National Labor Relations Act, the employer is under an express legal duty to bargain collectively with the chosen representatives of his employees. While collective bargaining does not require the employer to reach an agreement, it does require sincere negotiations with a view towards settlement of differences. Construing the contract involved in this litigation, the court finds that "it would seem quite clear that performance of this contract by the members of the association would require them to commit unfair labor practices. They would be prohibited as individual employers from signing agreements with the union. . . . The banding together of the employers for the purposes set forth in the instant contract further accentuates the disparity in the bargaining power between the parties which the act sought to equalize and in so doing further promotes industrial strife which the act sought to minimize."

The contract accordingly is held to be contrary to public policy, and void.

Overtime

Emerson v. Mary Lincoln Candies, Inc., decided by the New York Supreme Court, Erie County, February 16, 1940; reported at 17 N.Y.S. (2d) 851.

This suit is to recover $2,456.74, being twice the amount the plaintiff claims is his overtime wages under the Federal Fair Labor Standards Act of 1938, which, in Section 16 (b), makes the employer who fails to pay the mandated overtime compensation liable for the amount thereof, plus an additional equal amount as "liquidated damages" plus an attorney's fee. In ruling on separate alleged defenses to the suit, the court holds:

(1) That such a suit is not one for a penalty incurred under the laws of the United States, over which the Federal courts have exclusive jurisdiction, and that the state court has jurisdiction;

(2) That a statute regulating hours of labor may be upheld as an exercise of the police power even though it to an extent prevents the free making of contracts or contravenes existing contracts;

(3) That it would be a sufficient defense if proved that the plaintiff is engaged in an executive or professional capacity, exempted from the operation of the act;

(4) That the offer of $827.22 which auditors of the United States Department of Labor found to be the amount due was not a sufficient defense to the suit, since the act provides for the recovery of the additional moneys for any violation, wilful or not; and

(5) That it would be "presumptuous" for the state court to hold the act unconstitutional unless unconstitutionality clearly appeared, and it does not so appear.

Company Union

National Labor Relations Board v. Falk Corporation, decided by the U.S. Supreme Court, January 2, 1940; reported at 60 S. Ct. 307. In connection with an order directing the respondent company to cease and desist from interference with its employees' right to self-organization and to disestablish a "company union" dominated by it, the board directed an election for a collective-bar-

MANGANAL
REG. U. S. PAT. OFFICE
MANGANESE NICKEL STEEL
MANGANAL protects wearing areas by armoring any steel surface exposed to severe impact and abrasion. This 11 to 13½% manganese-nickel steel is supplied in the form of applicator (filler) bars, welding electrodes, forged wedges, wedge bars, and plates. MANGANAL Applicator Bars are supplied round, square, or flat for restoring worn surfaces. MANGANAL Wedge Bars are for repointing manganese and carbon-steel shovel and dipper teeth, while MANGANAL Individual Forged Wedges are hammered to size for attaching by welding to worn down shovel and dipper teeth. MANGANAL Hot Rolled Plates are supplied in thicknesses of 3/16 to 1 inch for patching or fabricating equipment subject to severe wear or abrasion. MANGANAL Bare and Tite-Kote Welding Electrodes are used for attaching these parts and for general-purpose welding, building up, armoring and "strengthwelds." Complete stocks carried by nearly 100 distributors. Write for details.

FOR HARD SURFACING SEACO

SEACO Hard Surfacing Electrodes give a weld deposit of 500-600 Brinnell hardness. A recommended finishing layer over MANGANAL — the underlying metal "work-hardens" for greater resistance to impact and abrasion.

SOLE PRODUCERS
STULZ-SICKLES CO. 134-142 Lafayette St., Newark, N. J.

gaining agent, the ballot to contain the names of a C.I.O. and an A.F. of L. union, but not the Independent (company) union. On petition by the board for enforcement of its order, the Circuit Court of Appeals (Seventh Circuit) modified the board's order, to permit the Independent Union to be put on the ballot. This action is found by the Supreme Court to be error, both because the Circuit Court of Appeals had no jurisdiction to review a proposed election and to supervise the manner in which should be conducted (there can be no court review until the board issues an order and requires the employer to do something predicated upon the result of the election), and because it was within the discretion of the board, rather than the court, to conclude that the company-created union "could not emancipate itself from habitual subservience to its creator, and that in order to insure employees that complete freedom of choice guaranteed by Section 7, Independent must be completely disestablished and kept off the ballot."

The Circuit Court also modified the board's order by omitting the requirement that the notices to be posted in the plant contain a statement that the company would "cease and desist" from its unlawful activities. This also is found to be error.

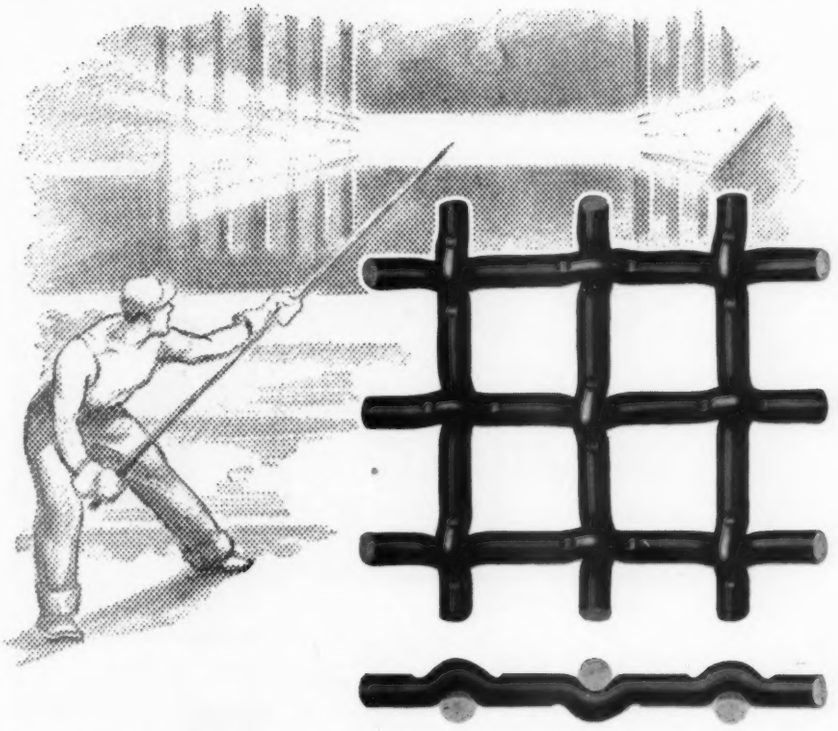
The Supreme Court remands the case to the Circuit Court of Appeals with instructions to enforce the board's order without any modification.

Collective Bargaining

Christiansen et al. v. Local 680 of Milk Drivers and Dairy Employees of New Jersey et al., decided by the Chancery Court of New Jersey, January 3, 1940; reported at 10 Atl. (2d) 168. This is a suit involving a collective-bargaining agreement, and in the course of its written opinion the court considers generally the validity of such agreements. Twenty years ago the "so-called 'contract' " which a trade union makes with an employer or employers' association was "merely a 'gentleman's agreement,' a mutual understanding, not enforceable against anybody." The real contract was between the employer and the individual workman. The only effect given the collective-bargaining agreement was "a presumption, in the absence of proof to the contrary, that its terms have been adopted as part of the individual contract." (Commons and Andrews, *Principles of Labor Legislation*, 1920 Edition, page 118.)

"Gradually, however, courts have come to the position that the collective-bargaining agreement gives rise to valid, enforceable contractual obligations. . . . The contract between employer and union not only enters into

THIS STEEL MAKING METHOD PUTS *LONG LIFE* INTO ROEBLING SCREENING!



THE cost of replacing screening is an important item to you. That's why you are vitally interested in getting long screening life.

Of course, how much life you *do* get out of your screening depends largely on the steel of which it is made. And, right here, it will pay you to remember this about Roebling "Abraso" Screening:—

Roebling makes its own screening steel—and, therefore, can assure you of a steel which possesses the toughness, and the wear and fatigue resisting qualities, which are so essential in economical screening service!

This Roebling Steel is made by Roebling's *custom-method*, in special small, open-hearth furnaces. Therefore, each lot of steel can be carefully watched and controlled—to assure strict uniformity and the desired high degree of resistance against wear and vibration.

Let us show you evidence of what this means in the way of screening economy in actual service. Our nearest office will gladly furnish the facts.

JOHN A. ROEBLING'S SONS CO.
TRENTON, N.J. *Branches in Principal Cities*

ROEBLING ABRASO SCREEN

TRADE JERSEY MARK

90 YEARS OF WIRE MAKING SPELLS THE DIFFERENCE

the individual contract, but it circumscribes the rights of the employer and the members of the union with respect to making individual contracts of employment. It creates legal rights and duties which are independent of particular hirings." A collective-bargaining agreement "is enforceable by or against individual members of the union in matters that affect them peculiarly; and it is enforceable by or against the union in matters which affect all members alike, or large classes of members, for instance, those who are employees of the other party to the contract."

It is also held that the contract is not "contrary to public policy and void" from the fact that it provides for a closed shop, unless it unreasonably restrains trade or tends to create a monopoly. There was no such showing in this case.

Strike

Diamond Candle Company, Inc., v. Fratello et al., decided by the New York Supreme Court, Special Term, November 10, 1939; reported at 16 N.Y.S. 346.

The plaintiff (employer) in this case sought an injunction to restrain the defendant (a union) from conducting a strike, which the union had agreed not to do in an agreement outstanding between it and the employer. The question for decision was whether the union had without justification breached the terms of the contract by calling the strike, or whether the employer induced the trouble by failure on its own part to perform the terms and conditions of the contract and such relevant provisions of law as must be read in conjunction therewith. In view of the conflicting nature of the affidavits it was impossible to determine whether the employer was entitled to the relief sought, and the case is set down for trial on that issue.

Records

Andrews v. Montgomery Ward & Company, Inc., et al., decided by the U. S. District Court for the Northern District of Illinois, Eastern Division, November 22, 1939; reported at 30 Fed. Supp. 380. This was a proceeding by the Administrator of the Wage and Hour Division of the U. S. Department of Labor for an order directed to Montgomery Ward & Company, and the secretary of that company, to show cause why they should not be required to appear and produce books, papers, and documents described in a subpoena. The subpoena, issued by the Administrator, called upon the respondents to appear before the Division's regional attorney and officer and produce certain books and papers relating to earnings and hours of the company's employees. The subpoena was a part of an investigation instituted upon the Administrator's finding that there was reasonable ground for believing that the company was violating specified provisions of the Fair Labor Standards Act of 1938.

The court holds that it is not necessary to determine in this case whether all the provisions of the act are within the power of the Congress. The judge is "of the opinion that Congress has power to prohibit the transportation in interstate commerce of goods produced in violation of the act. If there are sections in the act which exceed the power of Congress they are clearly severable and do not vitiate the whole act." The command of the subpoena to produce the books and papers therein mentioned is held not to constitute an unconstitutional search and seizure; furthermore, it was not too broad as covering employees engaged solely in intrastate commerce, since the only reasonable method of investigation is to have all the records so that the Administrator may determine for himself who are covered and who are not. The Administrator order sought is allowed.

Keep that crusher busy with the Brooks system of

1. LOADING
2. HAULING
3. DUMPING

LOAD LUGGER
Registered Trade-Mark

It's great for quarry work, where loading is done by hand. Buckets are spotted at convenient points and easily loaded from the ground. Less work for the men, more yardage by the day. Also economical for hauling ready-mixed concrete and bituminous aggregate for road building and construction jobs. The Load Lugger is simple and foolproof . . . mounts on any truck chassis . . . requires less than 20 seconds for picking up or dumping the buckets. Sizes: 1½ to 4 cu. yds.

Note: Try out the Load Lugger on the job—Ask about our Special Introductory Offer.

Write for BULLETIN No. 210-A

Write for BULLETIN No. 210-A

BROOKS EQUIPMENT & MFG. CO.
Knoxville 106 Davenport Road Tennessee
Distributors in All Principal Cities

PERFORATED METAL SCREENS
FOR SAND, GRAVEL STONE, ETC.

Manufactured exactly to your specifications.

Any size or style screen, in thickness of steel wanted with any size perforation desired.

We can promptly duplicate your present screens at lowest prices.

Prompt Shipment

CHICAGO PERFORATING CO.
2435 W. 24TH PLACE CHICAGO, ILL.
Telephone CANAL 1459

FOREIGN DEVELOPMENTS

Reactions of Alumina Cement with Water

Dr. G. Assarsson presented this report before the Congress of Cement Chemists in Stockholm. The reactions of water with alumina cement stand in close relationship with the constituents of which the cement is composed. Some of these constituents have not been investigated sufficiently; and others, again, have not been isolated in pure state from the technical product. The hydration reactions of the alumina cement so far have been investigated only through the behavior of the combinations in a pure state and of the technical products. The relationships between these two kinds of hydration reactions are discussed here. The old formulas given by Rankin and Wright for the combinations are used; and the following pure combinations are dealt with: C_5A_3, CA, C_3A_5, C_2F, C_2AS.

Previous investigations are reviewed and summarized, in which it appears that the results contradict each other in part. One aim of the investigations is to bring about a conformity between the hydration reactions of the pure water-free calcium aluminate and the hydration reactions of the alumina cement. The author discusses the chemical character of the hydration reactions, drawing also from his own previously-published investigations.

It is indicated that the qualities of the various cements depend to a large extent upon the individual qualities of the clinker. The greater portion of the hydration products consists of gels; and the greater portion of the clinker granules is hydrated, calcium aluminate as well as gehlenite and dicalcium silicate. Pure gehlenite and dicalcium silicate hydrate very slowly with pure water; but the corresponding combinations in alumina cement hydrate rather rapidly, due to the gehlenite of the cement admitting into its system a certain excess of bases (calcium oxide, alkalies) whereby the gehlenite formed in that manner is made favorable to hydration. The slowly-increasing content of alkalies in the solutions during hydration points clearly to a slowly-proceeding hydration of a certain portion of the clinker, which possibly proceeds from gehlenite containing some alkali.

After additional discussion, the author concludes:

In looking over the observations of hydration reactions of alumina cement, it is clear that no reaction formulas can be set up for the general procedure of hydration. Some of them are known from investigations of the individual constituents. But the qualities of technical cement depend upon the qualities of the compounds in it. It is shown that not only the analytical composition of the cement characterizes the qualities of every cement specimen, but that the mineral composition must be known also. On the other hand, there are certain other qualities which play a part in hydration—as the influence of deactivation due to a thin hydrated surface surrounding the clinker granules; or the size of the bodies, and the kind, in which they appear in the clinker, can also influence the properties of the technical products.—*Zement*, vol. 29, No. 1 (January 4, 1940), pp. 1-4; No. 2 (January 11, 1940), pp. 15-19.

Gypsum As Exciter in Furnace-Slag Cement

Dr. R. Gruen and Dr. R. Tiemeyer review the patent cases of Dr. Collosseus, Humboldt (Dr. Passow), and Dr. Kühl covering the production of cement from blast-furnace slags, using gypsum as the exciter. In France the gypsum-slag cement appears in trade under the name "Cilor" and in Belgium under the name "Sealithor"; and

Buy Pipe
BY RATING — NOT WEIGHT

IN Taylor Spiral you get the bursting strength, the collapsing strength and for all practical purposes the stiffness of wrought pipe weighing twice as much. By cutting the weight in half you cut the transportation cost, the handling cost, the erection cost. There is a size and gauge of Taylor Spiral Pipe for most sand, gravel and dredging needs—with joints for all services and protective coatings for all conditions.

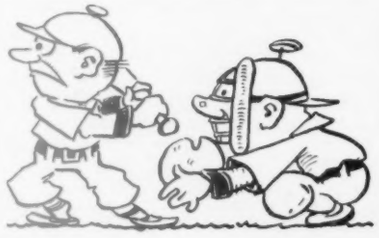
Ask for latest catalog.

TAYLOR FORGE & PIPE WORKS
General Offices and Works: Chicago, P. O. Box 485
New York Office: 50 Church Street

TAYLOR Spiral PIPE

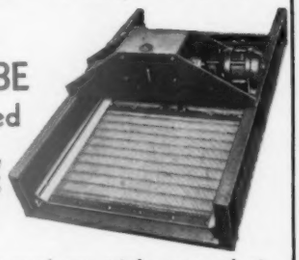
FARREL BACON
CRUSHERS
Complete plants designed and equipped, including Screens, Elevators and Conveyors. Machinery for Mines and Rock Quarries, Sand and Gravel Plants. Engineering Service

EARLE C. BACON, Inc.
17 John St. New York, N. Y.



Three—and OUT!

TRI-VIBE equipped



Leahy HEAVY DUTY VIBRATING SCREEN

Because it produces *triple-powered* vibration over the entire area of the free-swinging screen jacket, TRI-VIBE "strikes out" the clogging particles and keeps the meshes open . . . preventing *blinding* and insuring greater capacity and uniformity in *fine mesh screening.* Investigate the economy and efficiency of Leahy Type C Vibrating Screens with TRI-VIBE.

Send for Bulletin No. 14
THE DEISTER CONCENTRATOR COMPANY
The Original Deister Concentrator Co.
Est. 1906
911 Glasgow Ave., Fort Wayne, Ind.

it is claimed to have normal hardening, low heat of set, and high stability in salt water. These claims are tested individually.

Granulated blast-furnace slags with gypsum additions of 3, 6 and 12 per cent. are subjected to hardening tests. In five samples the basic slag has a silicic-acid content of 31.6 to 37.5 per cent., a lime content of 40.2 to 48.9 per cent., an alumina content of 9.2 to 16.7 per cent. Strength curves are given. Specimens of slag cement with 5 and 30 per cent. clinker addition, besides the gypsum addition, are also tested. All specimens are tested also according to test standards for streets cements. Tests are made also for shrinkage behavior, heat of set, salt-water stability.

It is concluded that the strengths of cements made by grinding blast-furnace slag with gypsum are good if the slags claim gypsum, such slags being principally those fat in alumina but free of manganese. Lessers gypsum-claiming cements give also satisfying strengths and especially then when the cements have a small addition of clinker which prevents sanding off.

The heat of set of such gypsum-slag cements is less than that of clinker-bearing cements. The gypsum-slag cements are suitable for mass structures due to the somewhat less hardening but also due to lower heat of set. They must be protected against drying out especially at the start, since they are sensitive to drying. The stability of these cements in salt water is good.—*Tonindustrie-Zeitung,* vol. 63, No. 91 (December 10, 1939), pp. 939-940; No. 92 (December 15, 1939), pp. 946-949.

German Standards for Metallurgical Cements

Portland cement, iron Portland cement, blast-furnace cement, and high-strength cement are reviewed as to the principal qualities demanded by German cement standards. Control of the manufacture of cement is exercised in Germany by various organizations or test stations including the following:

Laboratorium des Vereins Deutscher Eisenportlandzement-Werke.

Laboratorium des Vereins Deutscher Portland-Cement-Fabrikanten.

Laboratorium des Vereins Deutscher Hochofenzement-Werke.

Staatliches Materialprüfungsamt, Berlin.

Materialprüfungsamt an der Technischen Hochschule, Darmstadt.

Staatliches Veruchs- und Materialprüfungsamt an der Technischen Hochschule, Dresden.

Institut für Eisenbeton an der Technischen Hochschule, Carlsruhe.

Bautechnisches Laboratorium an der Technischen Hochschule, München.

Materialprüfungsamt der Bayerischen Landesgewerbeanstalt, Nürnberg.

Materialprüfungsanstalt an der Technischen Hochschule, Stuttgart.—*La Revue des Materiaux de Construction et de Travaux Publics,* No. 366 (March, 1940), pp. 19-22.

Using Slags Produced in Acid-Smelting Process

G. Muszgnug of the Gutehoffnungshuette Overhausen states in his foreword that the profitable utilization of the large quantities of acid slags obtained in smelting the iron-lean German iron ores has not been solved. Owing to its insufficient crystallization, the slowly-cooling slag shows but occasionally rock-like characteristics; and the rapidly-cooled acid slag has only low latent hardening capacity. Therefore the question arose whether, and to what extent, the smelter cements and smelter brick industry, which so far have used exclusively basic slags, can accept also the acid slag as raw material and work it into full-value building material. Some investigations have been made to help clear this problem.

At the Oberhausen blast furnace the acid smelting process has been used since September, 1937 on iron-lean iron ores containing, in part, high silicic acid. The acid slags have a silicic-acid content of 40 to 44 per cent., a lime content of 28 to 33 per cent., giving a lime-to-silicic-acid relation of 0.7 to 0.9, as compared to 1.1 to 1.3 for more basic slags.

After an introduction describing the characteristics and application of acid slag, the manufacture of iron Portland cement using acid slag as raw cement material and as a cement clinker aggregate is described by aid of analysis figures, and strength data and curves. The liter weight of basic slag varies from 600 to 800 grams and of acid slag from 1,300 to 1,400 grams, so that more power is required for grinding, amounting to as much as 15 kilowatt-hour additional in fine grinding per metric ton. In using acid slag for Portland cement, the production cost per ton of cement increased from 1.50 R.M. to 2.50 R.M.; this included 10 to 12 per cent. increase in limestone consumption for the raw mix, 5 per cent. decrease in yield, 1 to 2 per cent. increase in coal consumption in the burning process due to a greater percentage of undeacidified lime in the raw mix; at least 5 per cent. reduction in the output of the kiln; 5 to 10 percent. increase in clinker addition for cement; 8 to 15 kilowatt-hour increase in power for fine grinding per metric ton of cement.

The production of smelter brick by use of acid slag is discussed, including four series of extensive test data.

It is concluded that for qualitative reasons the addition of the slag to Portland-cement clinker is limited to 20 to 30 per cent. Per metric ton of iron Portland cement about 550 kilograms of acid slag can be utilized. The working of acid slag into cement is neither a qualitative nor technical problem, but essentially a problem of costs.—*Zement*, vol. 29, no. 4 (January 25, 1940), pp. 37-41; no. 5 (February 1, 1940), pp. 51-55.

TRAFFIC NEWS DIGEST

Sand, Gravel and Stone.—The Commission, by division 2, in the fourth section application No. 18,093, sand, gravel and stone to Champaign and Urbana, Ill., has given the New York Central and the Wabash relief from the long-and-short-haul part of the fourth section to meet truck competition from points not served by railroads. Single-line interstate rates of 60 cents a net ton on sand and gravel from Attica and Kern, Indiana, and 71 cents a net ton on sand and gravel from Terre Haute, Indiana, and on crushed stone from Greencastle, Indiana, and Lehigh, Illinois, were established to Champaign and Urbana, Illinois. Fourth section order No. 13,773 gives the relief and is to expire five months after the effective date of the rates. The present respective rates are 77 and 88 cents.

The proposed rates were to meet truck competition from a wayside pit near Penfield, Illinois, and a so-called wayside quarry at Fairmont. The report said that the reductions here proposed, together with similar reductions in certain of the single intrastate single-line rates to this market were handled under the so-called cooperative procedure at meetings of interested shippers and carriers in September, 1939. They were approved by all of the interested rail carriers as well as interested rail shippers, except protestants.

Protestants contended that unless corresponding reductions were made in the rates from Dickason and Thornton the proposed reductions would result in undue prejudice to them and undue preference of producers at Attica, Kern, Terre Haute, Greencastle and Lehigh. The report said the real object of the protestants was to prevent the reductions proposed from the plants of their rail competitors. The report also added that the proposed rates would not result in undue prejudice against protestants.

Fluxing Stone.—The Commission, by division 2, in No. 28,303, Ohio Calcium Company, Inc., *vs.* B. & O. *et al.*, has ordered removal of undue prejudice found to exist in rates on ferriferous limestone fluxing material from Lawrence, Ohio, to Farrell, Sharon and Weirton, Pennsylvania, and Wheeling, West Virginia. The Commission found the assailed rates from Lawrence were and for the future would be unduly prejudicial to the complainant to the extent they exceeded or might exceed corresponding rates that were or in the future might be contemporaneously maintained for application on roasted calcite from Martinsburg and Millvale, West Virginia, to the destinations named.

"THIS BUCKET SURELY DIGS"

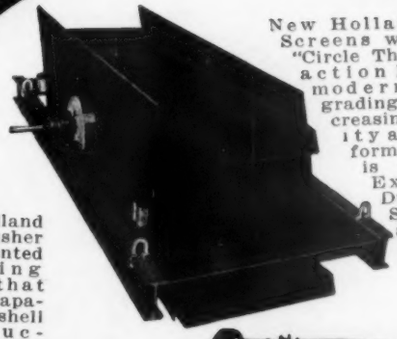
● Two Williams Buckets are owned by George Slade, General Contractor, Bridgeton, N. J. About the rehandler bucket used to load crushed stone and slag into trucks, he writes, "It is a marvelous rehandling bucket. Two to three dips and the truck is gone." About his ½ yard digging bucket, he says, "When it comes to excavating ditches, cellars and pipe lines, this bucket surely digs. We don't believe better buckets are built."

Send for free bulletins. They explain the fast, powerful action and rugged strength which make Williams Buckets so profitable to their owners.

THE WELLMAN ENGINEERING CO.
7014 Central Ave., Cleveland, Ohio

WILLIAMS Buckets built by WELLMAN

NEW HOLLAND



New Holland Screens with "Circle Throw" action have modernized grading by increasing capacity and uniformity. Above is shown the Extra Heavy Duty Vibrating Screen, available in full range of sizes—one to three decks.

New Holland Roll Crusher has patented pulsating feeder that doubles capacity. Rib shell construction increases angle of grip and reduces dust. All standard sizes—capacities up to 100 tons per hour.

Send for Bulletins

NEW HOLLAND MACHINE CO.

New Holland Pennsylvania

It was further found that the rate from Lawrence to Pittsburgh, Pennsylvania, would be unduly prejudicial to the complainant to the extent it exceeded or might exceed by more than 20 cents a ton of 2,000 pounds the rate that was or might be maintained from Martinsburg and Millvale to Pittsburgh. It decided that all the rates in question were not unreasonable. Further finding was that the rates from Lawrence to Detroit, Michigan, had not been shown to be unreasonable or unduly prejudicial. An order was entered by the Commission requiring carriers to establish by July 3, rates in conformity with the decision.

Marble and Granite.—Docket 28,278, Barre Forwarding Company *et al. vs.* Montpelier & Wells River Railroad *et al.*, heard before Examiner Burton Fuller at Chicago recently, is concerned with the applicability of rates published in Van Ummerson's commodity tariffs I.C.C. Nos. 220 and 260 to shipments of marble, granite and stone from origins in Massachusetts and Vermont to points in Illinois, Indiana, Michigan, Minnesota, Missouri, Ohio and Wisconsin. Witnesses for the complaining forwarding company and for shippers and receivers of freight handled through that company said that class rates were assessed on a large number of such shipments, instead of the lower commodity rates in the tariffs mentioned. Reparation was asked for in the amount of about $20,000.

Railroad attorneys contended that the commodity rates in the Van Ummerson tariffs were restricted by note to Canadian destinations. Other than the introduction in the record of the two tariffs in issue, no defense testimony was put in, and H. H. Powers, general attorney for the Grand Trunk, moved that the case be dismissed on the grounds that the complainants had not made out a case.

Central Freight Association Proposals.—Docket 62391. Shipper's proposal. Establish rate of 20.9 cents per net ton on slag, crushed or crushed commercial, (not granulated) in closed cars, c.l., from Hamilton, Ohio, to Charleston, West Virginia.

Docket 62393. Shipper's proposal. Establish rate of 41.8 cents on limestone rough, quarried, not suitable for building purposes, c.l., from Mier, Indiana, to Dover, New Jersey.

Docket 62424. Shipper's proposal. Establish rate of 17.1 cents per net ton on limestone, unburnt, agricultural, in bulk or in bags, in box cars, c.l., minimum weight 60,000 pounds, and rate of 15.4 cents per net ton on limestone, agricultural, in bulk in open top cars, c.l., from Danbury and Marblehead, Ohio, to St. Clair, Michigan.

Docket 62425. Shipper's proposal. Establish rate of 20.9 cents per net ton on limestone, ground or pulverized, unburnt, c.l., minimum weight 60,000 pounds from Lamson, Michigan, to South Bend, Indiana.

Docket 62427. Shipper's proposal. Establish rate of 66 cents per net ton on crushed stone and crushed stone screenings, c.l., from Logansport and Kenneth, Indiana, to Anderson, Indiana.

Trunk Line Association Proposals.—Docket 38763. Shipper's proposal. Establish a rate of 24 cents per hundred pounds on cement, common, hydraulic, natural, masonry, mortar or portland, c.l., from Brixment, New York, to Harlem Transfer Company Terminal, New York City.

Docket M-4175. Carrier's proposal. To cancel rates on limestone and lime, c.l., from Swatara, Pennsylvania, to Cornwall, Ontario, as published in Reading County Tariffs I.C.C. Nos. 1993 and 1994.

Docket M-4180. Carrier's proposal. To cancel commodity rate of 31 cents per hundred pounds on marble blocks, c.l., from New York stations to Stanbridge, Quebec, as published in Item 285 of L.V. R.R. Tariff I.C.C. No. C-8979, Item 150 of C.R.R. of N.J. Tariff I.C.C. No. G-5270 and Group No. 60 of D.L.&W. R.R. Tariff I.C.C. No. 23800.

Docket M-4181. Carrier's proposal. To amend Rate Proposal No. M-4120 to provide for cancellation of commodity rate of 37 cents per 100 pounds on clay, crude or ground, common or fire, c.l., from Baltimore, Maryland, to Plessisville, Quebec, only, also to provide for cancellation of rates from Chester and Marcus Hook, Pennsylvania, to Plessisville, Quebec.

NEW MACHINERY AND SUPPLIES

• Scraper

A new improved line of four-wheel scrapers, in a complete range of sizes matched to the new line of International TracTracTors, has recently been introduced by the Bucyrus-Erie Company. To simplify operation, to lessen chances for breakdowns and time losses, and to keep maintenance costs at a minimum, these scrapers are so simply designed that they have only five main parts, consisting of: (1) frame with side-plates, (2) tilting bowl, (3) apron, (4) tongue assembly, and (5) rear axle assembly.

Using two-line cable control, one cable to control height of digging edge, and the other to control the opening of the apron and tilting of the bowl, these scrapers give accurate depth of both digging and spread. In dumping, the bowl is tilted upward through an arc between the side-plates of the frame to an almost vertical position, giving positive, controlled, rolling ejection. The tilting bowl consists of a simple reinforced double-bottom plate curved below and behind the dirt, and rotating between the fixed side-plates of the frame. The front edge of the tilting bowl is hinged to the frame, just behind the digging blade, by means of a full-length solid bar. As it rotates about this hinge in dumping, the bottom of the bowl lifts, thus ejecting the dirt with a rolling motion. Since this ejection has the aid of gravity, minimum power is required to accomplish clean positive dumping. Adhesion of material is virtually eliminated by the sharp angle to which

New model 4-wheel scraper.

the bottom of the bowl is lifted and by its scraping action against the side-plates of the frame. These fixed side-plates close the gap at the sides between bowl and apron at all times, thus preventing any side spilling of dirt during loading or dumping.

For easy loading, the cutting edge holds the same efficient angle at all times while digging, and, because a practically constant wheelbase is maintained throughout the cycle, there is always uniform straight line pull from tractor drawbar to the cutting edge. The cutting edge is the exclusive Bucyrus-Erie double-curve type. The manufacturer claims that the "boiling" action produced by this double-curved blade reduces to a minimum the tractor horsepower required for loading, and materially increases speed and ease of loading.

A spreader for agricultural limestone which should be of interest to every quarry operator and crushed-stone plant who is merchandising this material to the farm trade has recently been placed on the market by the Galloway Company, Inc., Waterloo, Iowa. It can be mounted on the chassis of any standard motor truck, the feed is said to be adjustable and uniform at all times and the mechanism is positively driven from the truck motor by power take-off—not depending on wheel traction for power. Further details are available by writing the manufacturer direct.

• Table Fittings

Maine Steel, Inc., of South Portland, Maine, maker of power shovels, has announced its improved line of wire-rope fittings and other drop-forged products for use in pit, quarry and plant.

Included in the line are wire-rope sockets for use with ropes up to 2¼ inches in diameter, rope thimbles, shackles, eye-bolts and turnbuckles.

• Revolving Crane

The Thew Shovel Company, Lorain, Ohio, announces the introduction of the "Moto-Crane"—a full revolving crane, convertible to shovel, dragline, clamshell or backdigger—mounted on a 10-wheel, rubber-tired mounting. The Moto-Crane may be compared to the conventional type of crawler crane, consisting of a turntable and a crawler mounting. In the Moto-Crane a turntable of a design similar to the crawler unit is mounted on a specially designed, rubber-tired "crane carrier."

Mounted on the crane carrier is an improved turntable, built to the same general design and construction as employed in furnishing hundreds of turntables for mounting on motor trucks.

Moto-Cranes are built in five models, ranging from units in which minimum total weight is the main objective up to big-capacity, heavy-duty units that will carry 100 foot or longer booms. In all models the same general design principles, construction and features are used.

• Crawler Crane

The Lima Locomotive Works has added a new heavy-duty 60-ton crawler crane to its line.

A few of the features incorporated in Lima cranes, which range in capacities from 13 to 60 tons, include:

Independent clutches which hoist, travel, swing and boom up or down simultaneously; four drums, including a worm-driven boom hoist; smooth-operating clutches, controlled by

The 60-ton crane mounted on crawlers.

vacuum; helical-cut gears throughout the main machinery to reduce backlash and effect smoother, quiet operation.

Roller bearings at every vital bearing point reduce friction and lessen repair bills; square lever shafts with positive action; arrangement of main machinery affords proper balance for handling long booms at low angles; special steels are used throughout, to effect longer and profitable operation, with fewer delays; big diameter drums with wide faces effect greater cable economy.

• Monitor-Type Cab

One of the important recent improvements in locomotive crane design is the patented monitor-type crane cab developed by the Industrial Brownhoist Corporation of Bay City, Michigan. Available now on certain types of Diesel locomotive cranes, the monitor-type cab features 100 per cent. visibility in all directions for the operator.

Streamlined in appearance, the cab enables the operator not only to see the loads better which he is handling out in front, but also eliminates the blind spots to the rear and sides which are commonly found on many locomotive cranes. This ability to see perfectly both the work and the entire working area greatly reduces the accident hazard, allows faster hoisting and rotating speeds and increases output.

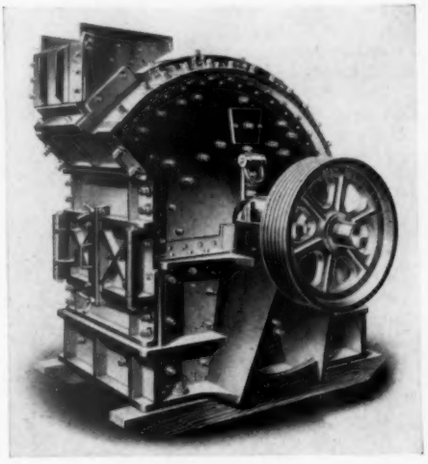
New locomotive-crane cab.

In addition, the operator works with greater comfort because of the perfect ventilation provided by windows opening on all four sides of his enclosure.

Monitor-type cab cranes conform to standard clearance dimensions and have ample headroom for working erect in the engine compartment.

• Crusher

The Kubit impact breaker, a new product of the Iowa Manufacturing Company of Cedar Rapids, Iowa, is a slow-speed, fixed-bar breaker which produces a uniform cubical product in any size required by simple variation of speed. The stone or other material is broken solely by impact. Breaker bars, rigidly fixed to a balanced rotor throw the material with shattering force against V-shaped impact bars, splitting the material along its natural grain. The broken pieces rebound from the bars to be again thrown against successive bars as the product travels downward. The broken material leaves the machine through a large opening in the bottom of the breaker. This discharge opening is unrestricted by grid bars or screen. There are no grates to wear out.



Impact breaker for producing cubical-shaped stone.

The size of the broken material varies according to the speed of the rotor. Higher speed produces smaller material. Since there is no grinding action employed, maintenance is kept at a minimum and the finished product is uniformly cube shaped.

• Locomotive

The new Model "BMG" Brookville locomotive was developed to make the economy, lugging ability and safety of Diesel power available in an exceptionally high-powered locomotive, confined to a height of only 56 inches to allow passage under low clearances. The engine is a General Motor Series 71-6 two-stroke cycle Diesel, developing 120 horsepower.

In this 10-ton locomotive, this 120 horsepower Diesel furnishes 12 horsepower per ton of locomotive weight, an exceptionally high ratio. Applied through a range of four speeds, in both forward and reverse, this makes possible a high speed up to 15 miles per hour, negotiation of heavy loads on grades on the higher gears, and consequently high daily tonnage.

Performance is said to be still further improved by the Brookville drive on all four wheels, steel tires which increase traction by

"BOSS"
HOSE COUPLINGS

Known everywhere for their efficiency, safety and economy, on high or low pressure steam, air or liquid lines. Built to eliminate leaks, pressure losses and shutdowns, and to protect hose ends. Washer Type (Illustrated) Style W-16; Ground Joint Type, Style X-34; Companion Male Coupling Style MX-16. Cadmium plated. Sizes ¼" to 4", inclusive.

"KING" DREDGE SLEEVE CLAMPS
Single Bolt, Style "SB" Double Bolt, Style "DB"
In addition to their superior strength and durability, these clamps incorporate several patented features that insure greatly increased efficiency and lower service costs. Ask the salesman who calls on you for details.

Stocked by leading rubber manufacturers and jobbers

DIXON
VALVE & COUPLING CO.
MAIN OFFICES AND FACTORY: PHILADELPHIA
Chicago . . Birmingham . . Los Angeles . . Houston

FOR YOUR *DUST* PROBLEM
SLY
DUST FILTERS

Hundreds in use in cement plants—in crushing, grinding and packing operations; in rock crushing plants, refractories, abrasives, asbestos, lime, gypsum and other plants.

Over 40 years' experience.

Sly installations are not expensive. They are engineered to pay for themselves.

Ask for new Bulletin No. 98.

THE
W. W. SLY MFG. CO.
Branch Offices in Principal Cities
4745 Train Avenue Cleveland, Ohio

Diesel-powered locomotive.

at least 25 per cent. over chilled face wheels, dual-journal spring suspension which permits negotiation of rough, uneven tracks or sharp curves at relative high speed, and Timken tapered roller-bearings in all wheel journals.

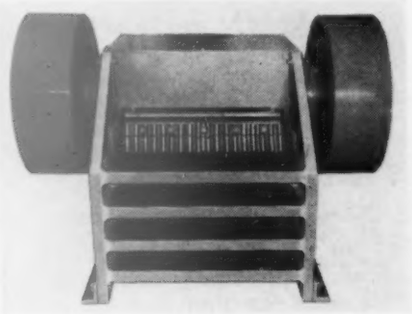
McGann Reorganizes

The McGann Manufacturing Company of York, Inc., York, Pennsylvania, has been reorganized. The controlling interests, which were vested in Robert G. McGann, former president, were acquired May 7 by H. Jay Hoff, William J. Burnett and William J. Kuntz, all of York.

The company, organized in 1922 by Robert G. McGann and William J. Kuntz, continued until 1929, at which time Mr. Kuntz withdrew and became manager of the lime-plants division of the Blaw-Knox Company of Pittsburgh, as well as president of Lime & Hydrate Plants Company of York.

Since its foundation the McGann Manufacturing Company has specialized in the manufacture of lime kilns, lime hydrators, double-shell driers, and special machinery for the chemical and other industries. All these will be continued under the reorganization and, in addition, the company will manufacture all the patented specialties for the lime industry which are controlled by Lime & Hydrate Plants Company, which will still continue as a sales organization for the requirements of lime manufacturers and drier users.

The officers of the McGann Manufacturing Company, Inc., will be William J. Kuntz, president; H. Jay Hoff, vice-president and treasurer; and William J. Burnett, vice-president and secretary. The officers of Lime & Hydrate Plants Company are William J. Kuntz, president and treasurer; Harold J. Kuntz, vice-president; and K. E. Barnhart, secretary. The offices of both companies will be at York.



The Eagle Crusher Company of Galion, Ohio, recently added primary jaw crushers of the 10-36, 15-36 and 18-38 sizes, with capacities from 20 tons to 90 tons per hour. They are fabricated from steel plate, electric welded, and have one-piece frames. Heavy-duty SKF self-alining bearings are used, which are thoroughly protected on each side from dust by labyrinth seals. Jaw plates are made of manganese steel and are reversible for double wear.

Trade Literature

Model 82-A Bucket Loader, 4 pages. Barber-Greene Company, Aurora, Illinois.

Equipment for Accident Prevention, 128 pages. Boyer-Campbell Company, Detroit.

Automatic Bottom Discharge Trailers, 4 pages. Sanford-Day Iron Works, Knoxville, Tennessee.

Telsmith Gravel Plants, 20 pages. Smith Engineering Works, Milwaukee.

Crescent Bucket Scrapers, 12 pages. Sauerman Brothers, Inc., Chicago.

Koehring Excavators, 20 pages. Koehring Company, Milwaukee.

Type B Cranes, Shovels, Draglines, 6 pages. Industrial Brownhoist Corporation, Bay City, Michigan.

Northwest Model 25 ¾-Cubic Yard Excavator, 28 pages. Northwest Engineering Company, Chicago.

Belt Fasteners and Rip Plates, 4 pages. Flexible Steel Lacing Company, Chicago.

What We Make, 32 pages. Jeffrey Manufacturing Company, Columbus, Ohio.

Rotex Screeners, 4 pages. Orville Simpson Company, Cincinnati.

Hough Tractor Shovels, 6 pages. Frank G. Hough Company, Libertyville, Illinois.

Gar Wood Dump Bodies, 4 pages. *Gar Wood Telescopic Hoists,* 6 pages. Gar Wood Industries, Inc., Detroit.

Sta-Kleen Screen, 8 pages. Allis-Chalmers Manufacturing Company, Milwaukee.

Elwell-Parker Fork Trucks (folder). Elwell-Parker Electric Company, Cleveland.

Symons Screens . . . Type F, 12 pages. Nordberg Manufacturing Company, Milwaukee.

The Jackson Concrete Brick Machine, 6 pages. Jackson & Church Company, Saginaw, Michigan.

A High-Speed Vibrator Screen That's Different, 4 pages. Coyle & Roth, Minneapolis.

Johnson Quality Bearing Bronze, 76 pages. Johnson Bronze Company, New Castle, Pennsylvania.

The C. Taylor Handman Company, Cincinnati; K. B. Noble, Hartford, Connecticut; Machinery Rental & Sales Company, Kansas City, have been appointed representatives of the Osgood Company. The first-named concern will also represent the General Excavator Company.

INCORPORATIONS

DELHI FLUORSPAR CORPORATION, Marion Kentucky. $30,000. H. F. McVey, J. L. Gregory, L. P. Strange and Mrs. M. E. Ziegler.

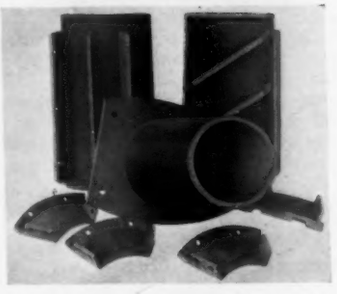
WEST TEXAS STONE COMPANY, Lueders, Texas. $30,000. J. W. Kell and associates.

SANTA PAULA ROCK COMPANY, Los Angeles. $50,000. Walter O. Schell, J. H. Wheeler and Elta Thompson.

MARION ROCK COMPANY, Coquille, Oregon. $100,000. Walter E. Marion, C. D. Christianson and L. D. O'Donnell.

LADWIG GRANITE GRIT COMPANY, Milwaukee. Wesley J. Ladwig, Laurence Hushah and Ruth E. Miller.

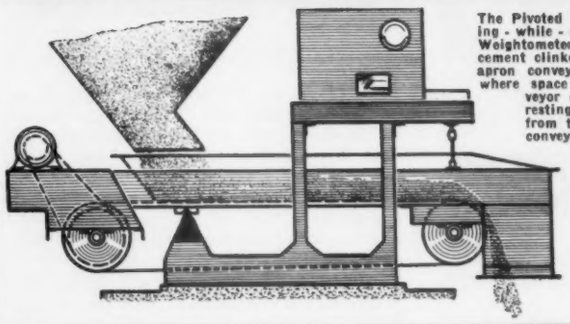
Avoid "BURNOUTS" BY USING PYRASTEEL for high temperatures



Continuous service at 2000° F., with no costly delays for replacing burnt-out kiln parts . . . that's the advantage of using PYRASTEEL for such items as Feed Spouts, Retainer Rings, Lifter Bars and Liners, shown above. Many other economical uses of this heat and corrosion resisting alloy in your cement mill equipment. Ask for Bulletin.

Chicago Steel Foundry Company
37th Street and Kedzie Ave., Chicago, Ill.
Makers of Alloy Steel for 30 Years

Weighing Cement Clinker Automatically



The Pivoted Weightometer possesses all the weighing-while-conveying advantages of the standard Weightometer. It is admirably suited to weighing cement clinker, and for hot clinker a steel pan or apron conveyor is used. It is designed for use where space is limited, having a weighing conveyor only 6 to 8 ft. long—the loading end resting on a fulcrum, the other suspended from the Weightometer. Tare weight of the conveyor is balanced out and the net weight of all conveyed material is accurately weighed and recorded.

Merrick Scale Mfg. Co.
PASSAIC, N. J.

The CONCRETE MANUFACTURER

A Special Section of...

A Florida residence constructed of concrete blocks made with lime-rock aggregate at the plant of the Cummer Lime & Manufacturing Company.

The CONCRETE MANUFACTURER

June, 1940

A SPECIAL SECTION OF PIT AND QUARRY DEVOTED TO PRODUCTION MARKETING AND USES OF CONCRETE PRODUCTS AND READY-MIXED CONCRETE

Published by Pit and Quarry Publications
538 South Clark St. Chicago

●

H. W. BAUMGARTNER
President

STANLEY A. PHILLIPS
Vice-President and Directing Editor

Field Editor:
W. E. TRAUFFER

Assistant Editor:
HARRY F. UTLEY

Circulation Manager:
W. T. KLUSSMAN

●

Advertising Manager:
JAMES E. MONTGOMERY
Telephone HARrison 9357
Chicago, Ill.

Eastern Advertising Manager:
W. A. WILSON
Room 430, 122 East 42nd St.
Telephone CALedonia 5-4438
New York, N. Y.

Central Advertising Manager:
W. H. SANDERSON
Auditorium Bldg.
Telephone CHerry 4432
Cleveland, O.

Advertising Representatives:
D. R. EGBERT
Chicago, Ill.

W. H. GRUBBS
Western Pacific Bldg.
Telephone Prospect 3746
Los Angeles, Cal.

DUNCAN A. SCOTT & CO.
Mills Bldg.
Telephone Sutter 1393
San Francisco, Cal.

Field Representatives:
A. C. PETERSEN
J. K. GARESCHE

Big Market Looms for Burial Vaults

CONVENTIONS as a rule are of interest only to the members of the industry represented, but the annual session of the National Concrete Burial Vault Association at the Netherland Plaza hotel in Cincinnati May 7, 8 and 9 was a notable exception. The developments at this convention are of interest to all manufacturers of concrete products, also the pit-and-quarry industry, as a market for concrete units that promises much for all was unfolded.

P. N. Rothe of *Casket & Sunnyside* sounded the keynote when he told the burial-vault manufacturers that they have no reason to worry about a saturation point for their product. While the mortality rate is constantly declining—17.6 per thousand in 1900 to 10.6 at present—the total mortality is increasing from 1,273,699 in 1900 to 1,382,437 now. With the rapid elimination of wood boxes the future of the concrete burial vault is assured.

The annual manufacture and sale of casket containers were outlined by the speaker as follows:

Concrete burial vaults 230,000.
Metal vaults 150,000.
Good wood boxes 50,000.
Cheap wood boxes close to 1,000,000.

The latest-mentioned figure represents the potential market for concrete vaults and the new cheap concrete-slab boxes, which have recently become available and are being sold at approximately the price of the cheap wood boxes.

Additional light on this situation was given in a talk by C. R. Runyan, superintendent of Spring Grove Cemetery, Cincinnati, whose topic was *Elimination of Sunken Graves.*

Mr. Runyan said the cemetery industry is vitally interested in the increased sale of burial vaults as the use of wood boxes with the inevitable results of sunken graves, cost the cemetery operators a large sum of money. The top of a wood box rots in a few years and the grave caves in, which means stripping the sod, refilling with dirt and resodding. A few years later the casket top gives way and the entire process has to be repeated.

Spring Grove solved this problem by offering a natural-stone burial box or grave liner for approximately the price of the cheap wood box and this practice continues except when the bereaved family provides for a regular concrete burial vault through the funeral director. Some states, it was brought out, are eliminating the wood box by legislation, while in other cases the cemeteries are accomplishing the same result by banning their use.

The subject of association advertising was discussed very thoroughly and it was agreed that it should be continued and even increased if possible. To take care of this provision the dues were increased from $15 to $25 annually. Special assessment for advertising will not be made after January 1, 1941. Approximately $1,500 will be spent in the trade press reaching the funeral directors, this covering monthly insertions of advertising copy.

Another interesting feature of the convention was the demonstration given by Paul Woodworth of the Portland Cement Association at the local plant of the Huber-Baxter Company, where approved methods of designing a proper mix that would conform to specifications and be pleaceable under average plant conditions were fully explained. Three buses were required to transport the members to the demonstration and afterward there was a visit to the J. R. Van Meter plant, where refreshments were served. Later Mr. Woodworth gave an analysis of his demonstration in the convention.

Chicago was chosen for the 1941 convention. The election of new officers resulted as follows: president, F. L. Mathies, Burial Case Company, Inc., New Haven, Connecticut; vice-president, G. H. Blackstone, Blackstone Burial Vault Company, Zanesville, Ohio; secretary-treasurer, (reëlected) R. W. Mead, American Vault Company, Cleveland; new directors, L. K. Huber, Huber-Baxter Company, Cincinnati, and Hubert McQuestion, Lake Shore Burial Vault Company, Milwaukee.

A committee to make arrangements for the 1941 convention includes the following: Wilbur W. Haase, American Vault Works, Inc., Forest Park, Illinois; H. A. Dahlquist, Sterling Concrete Vault Company, Chicago; and Fred Kitz, Kay-El Manufacturing Company, Chicago.

An innovation in the association's

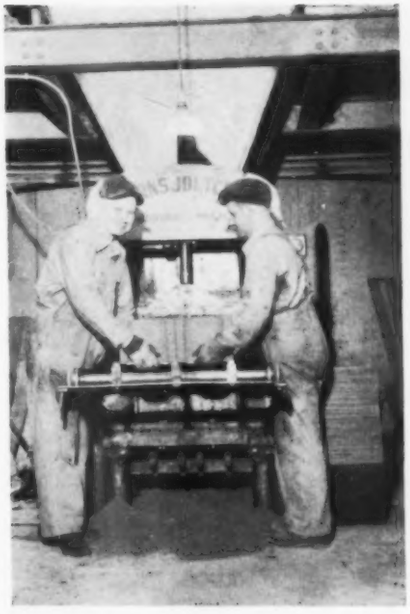
(*Continued on page 71*)

By HARRY F. UTLEY

Modern Machines, Properly Used, Aid in Keeping Cost of Production Down

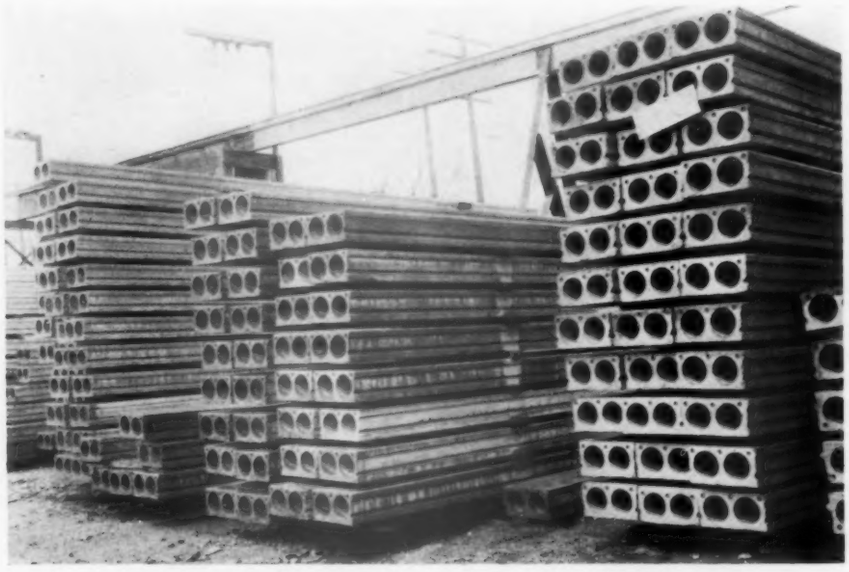
MANY of the costs which enter into the manufacture of concrete products are fixed and inflexible, while the selling price of the finished product is usually too low, and entirely too flexible, to allow any great margin of profit. Most operators have no control over material costs, while wages, taxes, insurance, etc., account for a definite part of operating overhead. A visit to a plant operated by one of the larger, successful manufacturers, however, usually provides the observer with the reasons for his success. The complete answer is nearly always found in the use of modern mechanical aids which increase the productivity of the workmen and thereby reduce production costs. An efficient, well-planned layout, which eliminates waste motion, can also be seen playing an important part in economical production.

Typical of plants of this type worth visiting and studying is that operated at Indianapolis by the Spickelmier Fuel & Supply Company. One building houses the concrete-block department, which can turn out 1,000 units an hour with little labor. Another building is devoted to a relatively-new venture, the manufacture of Flexicore reinforced-concrete floor and roof slabs, where straight-line production and mechanical handling are very much in evidence.



One of the two block machines which have a combined hourly capacity of 1,000 units.

Partial view of storage silos, block plant and storage yard of the Spickelmier operations.



Some of the concrete floor slabs in the yard awaiting shipment.

Both gravel and Haydite units are produced at the block plant. The control of costs is apparent right at the beginning in the storage, handling and proportioning of the raw materials. Gravel is obtained locally and is received in motor trucks, Haydite in railway cars, while cement is purchased in bulk for economy. Elevators carry these materials to, and store them in, five reinforced-concrete silos arranged in line. One silo is for cement, two silos store gravel, and the other two are used for Haydite. There is no further handling, the silos forming one wall of the plant while gates and screw-conveyors on the plant side allow the materials to flow directly into a batching car which moves on rails along the mixing floor.

Two Blystone 21-cubic foot mixers are located immediately above the two Stearns No. 9 Joltcrete machines and materials are proportioned automatically by weight from the batching car into each mixer. Farther along another

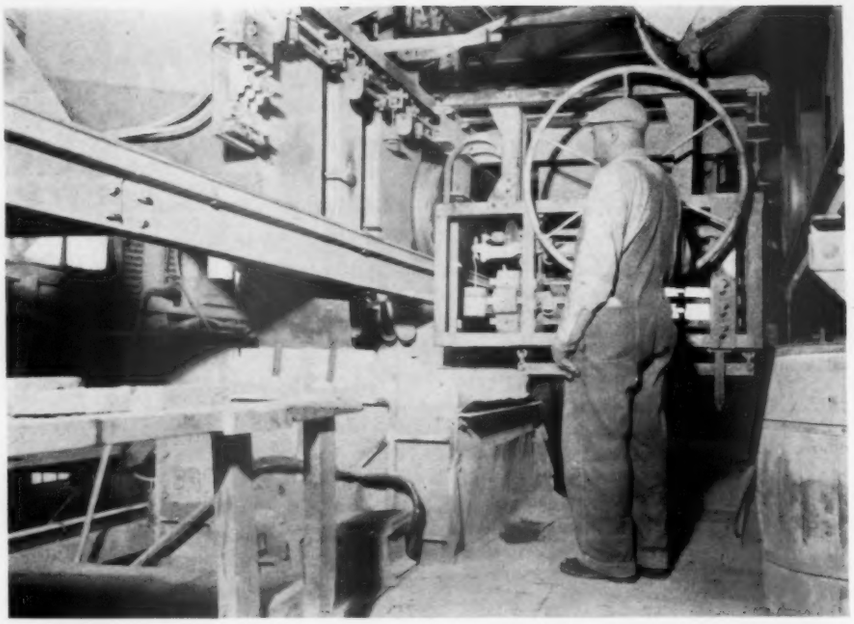
Blystone mixer serves an Anchor power tamper which is used occasionally and exclusively in the production of concrete bricks. All the batching operations and supervision of the mixing are cared for by one man.

Each of the Joltcretes—one turning out Haydite blocks, the other gravel-concrete units—makes three standard-size blocks at one operation. They have a combined capacity of 18 per minute. Off-bearers rack the blocks immediately and the steel racks holding three tiers of units are moved into the curing rooms with Barrett-Cravens lift-trucks, of which three are in service. This is the only point in the manufacturing process where manual effort has not been supplanted by power-driven machinery. The plant ends of the curing rooms are so close to the production machines that little time is consumed by the workmen in moving the racks into the tunnels and returning for other rack-loads.

Heat and moisture for curing in the nine tunnels is supplied by steam, the tunnels being 63 feet long, 14 feet wide and 8 feet high. After the curing is completed the racked blocks are taken out into the concrete-paved storage yard by gasoline-powered Clark "Truc-lifts", two of these units, which are ridden by the operators, being engaged in this service. The production of block usually ranges from 4,000 to 10,000 units daily, depending upon the demand.

The tamper used to produce bricks.

The Flexicore plant, where the slabs are produced, was equipped by the Price Brothers Company of Dayton, Ohio. The Price concern licenses various products manufacturers to produce and sell the units in closed territories, the Spickelmier firm having the Indianapolis area. Just completing its first year devoted to the production of these floor and roof units, it has sold thousands of feet for installation in industrial, residential and commercial buildings.



One of the mixers with automatic weighing equipment above and batching car at right.

The Flexicore units are 6 inches deep, 12 inches wide and are produced in lengths up to 22 feet. Two circular openings, 4⅜ inches in diameter, extend the full length of each unit, while 5 bars of steel, with stirrups, constitute the reinforcing. The upper 4½ inches of height of each unit is offset at the sides to provide an open joint for grouting after the floor is set.

Three gasoline-powered lift trucks are used to handle cured blocks and transport concrete to the floor-slab plant.

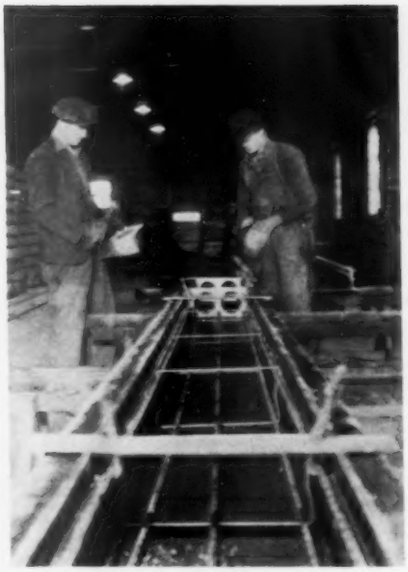
The process of manufacture consists of first assembling the rods, stirrups and pneumatic rubber cores in a steel form, each length to be cast requiring a separate form. The plant uses forms in two lengths—22 feet and 16½ feet. The two core holes are formed by heavy rubber tubes which are inflated with compressed air through a valve at one end identical to that used in an automobile tire. Enough air is admitted so that the tubes are rigid and in perfect alinement in the form. An overhead electrically-operated traveling crane then picks up the assembled form and carries it forward to a vibrating table, where the concrete is shoveled in and the form vibrated for a short period until the material is thoroughly compacted. It is then struck off and the crane picks it up and carries it to the curing kiln. The concrete is not mixed at the Flexicore plant but comes from the block plant previously described, being prepared in the same mixer which serves the brick tamper. It is chuted into a concrete bucket of ½-cubic yard capacity and transported by another Clark Tructractor to the Flexicore plant, where it is dumped

Because of the short haul, hand-lift trucks are used to move fresh blocks from the machines into the curing rooms.

into a box convenient to the vibrating table.

The special kiln, wherein the freshly-made slabs are placed to be cured with steam, is of concrete-block and steel construction. Each filled form fits neatly into the sections. There are sufficient sections in the kilns to accommodate a full day's production, so ample time is afforded to cure the concrete properly. The slabs are cured in the steam overnight and removed by the crane the next morning. The rubber cores are then deflated and pulled out, the forms stripped, cleaned and re-oiled for use, while the crane carries the slab to storage. Both outdoor and indoor storage is used, the crane runway extending about 100 feet out into the yard. The crane is also used to load the slabs on motor trucks and trailers for delivery to the job.

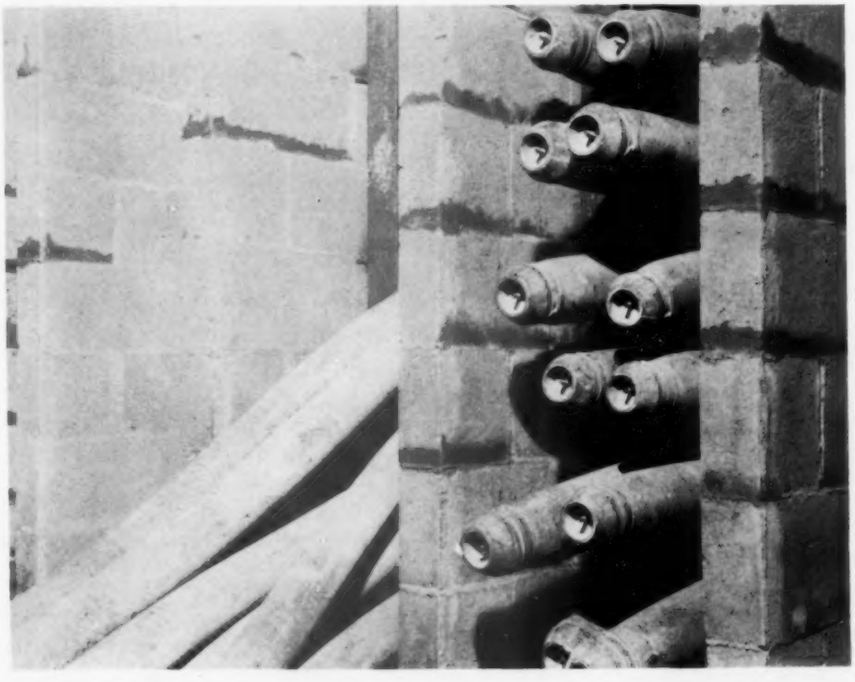
Overhead electric crane placing a floor-unit form on the vibrating table.



Assembling reinforcing and stirrups in a form preparatory to placing the pneumatic cores.

A rich mixture which develops 3,500-pound concrete is employed in making the slabs and only sand-and-gravel aggregates are used. The cellular openings account for about 50 per cent. of the slab volume and therefore reduce the weight a like amount. These holes also serve as ducts in the floor to accommodate wiring and other utilities, provide a measure of insulation from heat or cold, and reduce the transmission of noise. They may be cut readily on the job with a carborundum saw or with hammer and chisel. The slabs not only possess ample structural strength but, when laid in place and the joints grouted, a practically monolithic floor, smooth and level, results. The undersides of the units likewise form a finished ceiling surface that is ready for painting or other decoration.

Herbert De Vault is superintendent in charge of both plants.



Close-up view of the compartments where the slabs are steam-cured showing the valve ends of the pneumatic cores. Those at the left have been deflated and partially removed.

Burial Vaults

(from page 68)

history was the first exhibit of equipment and supplies, which occupied a large room adjoining the convention hall. The exhibitors included: the Ashland Vault Company, Ashland, Ohio, which showed a grave-lowering device and also distributed literature on its burial-vault forms; the Elwell-Parker Electric Company, Cleveland, which demonstrated the use of its lift-trucks; Doswell & Kover, Ft. Wayne, Indiana, vaults made with D & K forms; Norwalk Vault Company, Norwalk, Ohio; Safety Vault Corporation, Cleveland, which showed forms for making slab burial boxes, also top and bottom-seal vaults; Berg Vault Company, St. Louis, which had on display a vault made with its own forms; and the Ives Concrete Company, Dixon, Illinois, which exhibited a stencil for marking names on the tops of vaults.

The banquet of the National Burial Vault Association was attended by practically all the delegates and their ladies. The equipment trade was also well represented.

Committee to Meet

The Committee on Cement, Lime and Plaster of the Federal Specifications Executive Committee will hold an open meeting June 28 at 1:30 p. m., in room 301, Industrial Building, National Bureau of Standards, Washington, D. C.

At this meeting any one interested in presenting his thoughts personally regarding the proposed amendment to Federal Specification SS-L-351, Hydrated Lime for Structural Purposes, will be welcome to do so.

The proposed amendment consists of a paragraph to be added to the detail requirements of the above referred to specification, which states "The total free (unhydrated) calcium oxide (CaO) and magnesium oxide (MgO) in the hydrated product shall not exceed 8 per cent. by weight (calculated on the as received basis).

The amendment also comprises a method of chemical analysis through the use of which it is possible to determine if the lime has been hydrated to the extent set forth in the above cited paragraph.

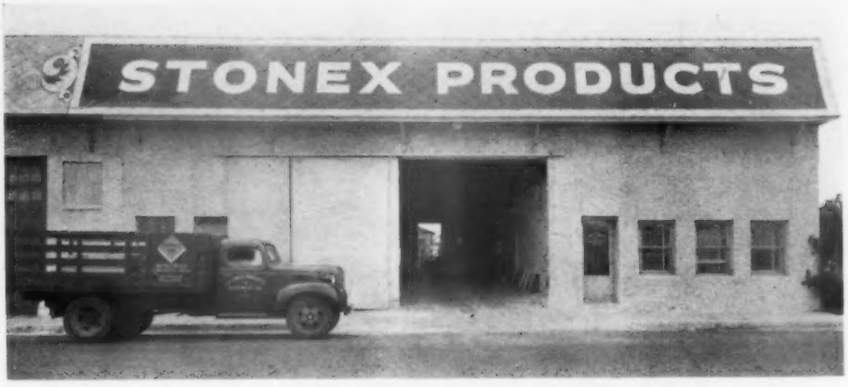
By W. E. TRAUFFER

Concrete Tiles on Concrete Joists Provide Low-Cost, Fireproof Floors

WHEN it comes to concrete products there is always something new to be found in Miami, and this year is no exception. Builders in this area know a good thing when they see it, which may explain why concrete building units are used in such a large percentage of the houses built. It may also be the reason why A. H. Sexton picked southern Florida for the introduction of his Stonex floor and wall tile which he had worked ten years to develop.

The idea of making a good, low-cost concrete floor tile came to Mr. Sexton about ten years ago, when he was a building contractor in a northern city. He wanted to use tiles in medium-priced houses but found the cost too high. He first developed a trowel-faced tile made on a roofing-tile machine. Later he discovered that vibration made a much better product and developed a manufacturing process which he promoted for some years in coöperation with the Superior Cement Corporation. In 1934 he again worked independently and developed the Stonex process, which has been protected by patents. In that year Mr. Sexton established a plant in Nashville, Tennessee, but, seeing the possibilities of the Florida market, decided to concentrate his first real efforts there.

The first licensee under the Stonex patents was the Ketchin Brick & Tile Company, Fort Lauderdale, Florida, which now has the rights to Broward and Palm Beach Counties. After additional development work this company began early in 1939 to push this product with remarkable success. The second licensee to operate under Mr. Sexton's process and method was the Stonex Products & Equipment Company, Miami, which was formed September 7, 1939 to manufacture Stonex tiles and precast concrete joists. This company has the rights for Dade County in which are Miami, Miami Beach, Coral Gables, Coconut Grove, etc. Since that time the rights to the remainder of the state of Florida were given to Crete Stone Industries of Florida, Inc., at Orlando. This firm, according to Mr. Sexton, will build plants in Orlando, St. Petersburg and Jacksonville. Walter Mast of the Sugarcreek Clay Products Company, Sugarcreek, Ohio, and Mr. Russell of the Goshen Brick Company have con-



One of the delivery trucks at the Stonex plant.

Attractive showroom in the office where the floor and racks exhibit the company's products.

Pans with facing in place being filled with concrete on vibrating table.

Cutting a joist with an abrasive wheel. Spreaders which separate joists in the floor are in the background.

tracted for Ohio and will operate six plants under the name of the Ohio Stonex Company. Hoke Concrete Works, Raeford, North Carolina, has contracted for that state and plans to operate several plants in that field. Other states will be developed as quickly as possible.

The Miami plant, with which this article is chiefly concerned, went into operation late in 1939. It is located about a mile from the business section of Miami and within easy reach of the areas of active building. This plant has a capacity of 1,200 lineal feet of joists and 1,600 square feet of large floor tiles daily.

Concrete for tile backing and for joists is made from local sand screenings and pea rock. A Chain Belt Rex 7/8-cubic yard paver does the mixing. The concrete is discharged through a chute into the concrete joist forms on the vibrating table or into wheelbarrows for the tiles.

Stonex floor tiles in the different sizes are made from well-graded quartzite sand from Interlachen, Florida. Pure mineral pigments from The Smith Color & Chemical Company are used exclusively. Pallets of all sizes are made from a specially processed and polished sheet steel, and are chemically treated from time to time to cause the finished tiles to be removed with a perfect finish. When the tiles are removed from the pallets they are stacked and covered with wet canvas to retain moisture and to maintain an even temperature.

Unlike porcelain and quarry (clay) tile, Stonex can be made in an unlimited range of colors, combinations or patterns. Colors range from the most delicate shades of greens and blues to dark brown and black. Ordinarily the floor tiles are made with a dull, but very smooth, finish which has an absorption of less than 2 per cent. A highly-glazed finish can be obtained by vibrating the tiles a little longer. Only the more popular colors are carried in stock, the others being made to order. Other "specials" are also made to order, including marbleized tile in various colors and shades for table, bar, counter tops, window stools, mantels, etc.

It has been found that the difference in the colors of various brands of cement causes a difference in the finished tiles and that some cements will not mix with colors. For this reason the company uses only one brand of gray and one of white cement for the dark and light shades. Sometimes both cements are used in the same tiles to get special effects.

Most of the tiles produced are 24- by 24-inch floor units, which are 2 inches thick. Other sizes made are 12- by 12-inch, 6- by 12-inch and 6- by 6-inch. The use of the smaller tiles in random patterns is growing in popularity. These are all 3/4 inch thick except on special order. All the floor tiles have grooved beveled edges to prevent vibration or expansion from loosening them after they are in place. The wall tiles are made 1/2 inch thick in 12- by 12-inch, 6- by 12-inch and 6- by 6-inch sizes.

The company also does not believe in carrying a large stock of joists on hand. Whenever possible they are made to dimensions from blueprints for each job and in lengths of from 6 to 24 feet. The use of quick-setting cement makes it possible to deliver joists on a job within fourteen days. When delivery from stock is necessary joists are cut to the required length by a Stone Machinery Company heavy-duty portable saw with a Carbrasive Manufacturing Company carborundum-type wheel. Running at a speed of 2,300 r.p.m. this wheel cuts an 8-inch joist in 1 1/2 minutes and goes through a tile as if it were wood. A 14- or 18-inch wheel 1/8 inch thick is used and this can be worn down to less than 8 inches in diameter before it is discarded. On a test one of these wheels cut 15 joists with only 1/8 inch of wear.

The joists are made on a Stonex vibrating table with clamps which hold the steel divider and side plates. Channel iron spacers or pallets are used. Ten 8-inch joists 3 inches thick are made at one time and other sizes in proportion. A fairly dry 1:2:2 mix is used with 5 to 6 gallons of water per sack of cement. After 3 to 4 minutes of vibration the forms are secured with separate clamps or yokes and are removed to a level floor by an overhead traveling chain hoist using two points of suspension. After 24 hours the forms are removed and the joists are stacked indoors where they are kept covered with wet burlap for fourteen days.

The 8-inch joist, for which there is the greatest demand, is ordinarily made with a 3/8-inch reinforcing rod in the top, a 3/4-inch rod in the bottom, and stirrups at an average of every 6 inches of length. This standard 8-inch joist in place on a 12-foot span will carry a load of over 800 pounds per square foot with a deflection of 3/8 inch and returns to 0 after the load is removed with no

Floor and wall tiles in storage in the plant. Preliminary curing racks at the right.

Pouring concrete into joists forms. A paving mixer is used.

injury to the joist. On special order the 8-inch joists are sometimes made with heavier reinforcing or in 4-inch widths. Various widths of 10- and 12-inch joists are also made, all in standard shapes, with reinforcing up to 1 inch round top and bottom. The concrete in these joists has a crushing strength of over 5,000 pounds per square inch. The vibrated concrete has a high density which protects the reinforcing steel from the destructive salt air near the ocean.

Short joists, such as the 8-foot 8-inch units, are made in dual sets with a wooden end block between them. Two

Machine which removes beveled and grooved floor tiles quickly and easily from the pans.

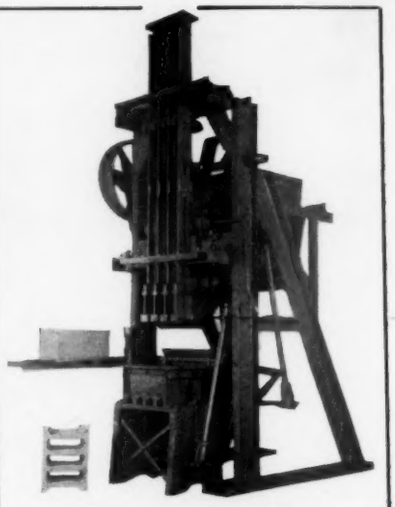
different lengths of short joists are also made at the same time in this manner. In the same forms 24-inch center joists for spacers and for bridging between joists on long spans are also made. For these a special end block is used so that the ends of these spacers will interlock with the webs of the joists. These spacers are also made simultaneously with the shorter joists.

By perfecting its production methods the company has been able to undersell porcelain and clay tiles and, as a result of this and its other advantages, has obtained a growing percentage of this business. The floor tiles in stock colors are being sold in place for as low as 45 cents per square foot, the same as poured-in-place terrazzo. The large floor tiles with concrete joists even compete in cost with ordinary wooden flooring as it then sells in place for as low as 62 cents per square foot in stock colors. This is considerably below the cost of No. 1 hardwood flooring in this section.

Most of the output of this plant has been used in house, apartment and hotel construction for both floors and walls. Many architects and engineers now specify this type of construction. The company has also bid on a large housing project to be built in Key West.

The Marquette, Michigan, firm of L. W. Brumm, Inc., has launched a ready-mixed-concrete business to serve the cities of Marquette, Negaunee and Ishpeming. Two 2-cubic yard truck-mixers are in service.

CONCRETE PIPE MACHINE SURPLUS EQUIPMENT
Jackets, Cores, & Pallets
36" 42" & 48" Bell & Spigot
48" & 54" Slip-Joint
EASTERDAY CONCRETE PIPE CO.
BLACKWOOD, N. J.



An All-Purpose Machine

The Junior Stripper will turn out more blocks per man than any other hand-operated machine on the market . . . 200 per hour being easily maintained! Nor has quality of output been sacrificed for the sake of speed. Units are uniformly dense, true to shape, of uniform texture.

Hobbs block machines, Anchor tampers, Anchor Jr. strippers, Stearns power strippers and Joltcrete, Stearns mixers, and Cast Iron and Press Steel pallets Straublox oscillating attachments, etc. Repair parts for: Anchor, Ideal, Universal, Stearns, Blystone mixers and many others.

ANCHOR CONCRETE MACHINERY CO.
G. M. Friel, Manager — Columbus, Ohio

LESS BREAKAGE

WITH COMMERCIAL CORED STEEL PALLETS.

Blocks made on cored pallets are better blocks because they are more uniformly cured and cheaper to cure. Cored pallets permit use of machines which leave no core bar marks or weak places beneath core bars either on faces, ends of corner block, or webs.

The user of cored pallets is not limited as to the range of core sizes. He buys cored pallets with the maximum air space and produces blocks with smaller air space by using shouldered cores.

THE COMMERCIAL SHEARING AND STAMPING CO.
YOUNGSTOWN, OHIO

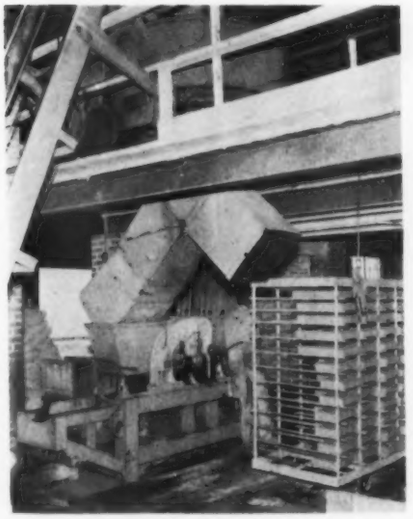
Exterior view of the new plant with truck being loaded for a delivery.

Southern Aggregates Producer Creates Concrete-Brick Market

AGGREGATES producers in increasing numbers are realizing their advantages in the production and marketing of various by-products including concrete building units. A recent addition to the already-imposing list of such producers is the Grove Stone & Sand Company of Grovestone, North Carolina. This company, a producer of sand and gravel at this location since 1924, early in 1938 put in operation a modern new sand-and-gravel plant at Grovestone, 11 miles east of Asheville, which was described in the February, 1939 issue of PIT AND QUARRY. A new concrete-brick plant was put in operation in June, 1938 on the site of the old aggregate plant.

Concrete brick was a comparatively new product in the Asheville area, which takes most of the plant output, and sales for a time were small. This gave the company an opportunity to build up a stock of 550,000 bricks before the plant was shut down for the winter in October. By the time the plant was started up again in March 1939 this stock had dwindled to 150,000 bricks. In that year the demand for bricks for small buildings and homes increased and with it the company got several large contracts. A new Woolworth 5- and 10-cent store in Asheville required 200,000 bricks, a high school at Leicester, 20 miles west of the plant, required 400,000 bricks, and a new Coca Cola plant at Asheville required over 700,000 bricks.

Unlike most other concrete-brick producers who are forced to build their plants of concrete blocks, clay bricks or other materials available locally, this company figured out a way to make its plant an advertisement of its own product. This was done by erecting a temporary wooden structure which housed the equipment until enough bricks had been made and cured for the plant structure. This attractive concrete-brick building is 45 feet wide and 70 feet long with ample space for the installation of additional equipment in the future. Steel-sash windows, concrete floors, a concrete outdoor-storage floor and other refinements contribute to its good appearance.



Brick machine, mixer and partly-loaded rack.

Steel racks loaded with bricks for preliminary curing indoors.

The aggregates used in the manufacture of these bricks are brought by trucks from the company's plant a few thousand feet away. They are dumped into piles on a concrete floor under a roof extending from the building. Barrows with Goodyear pneumatic tires are used to feed the skip-bucket which serves the Dunn mixer. These barrows have a water-level capacity of 4 cubic feet each and are marked for 3 cubic feet as 7 cubic feet of aggregates is used per sack of cement. Cement is dumped into the skip from sacks. Concrete is discharged from the mixer through a chute into the hopper of the Dunbrik

Hauling a rack-load of bricks to outdoor storage.

machine. This chute is so arranged that a second brick machine or other machine can be installed at any time and the skip and mixer are large enough to handle material for the additional output.

The bricks are removed from the machine on the usual 3-brick pallets to Dunn steel racks which hold 720 bricks each. Twenty of these racks are used as the plant has a daily output of about 14,400 bricks in 8 hours. Each rack has two rear wheels and is moved by means of Dunn 2-wheel lift jacks. The racks are kept indoors until the following day when they are moved outside and unloaded. The empty racks are then taken back into the plant and reloaded at the machine. By unloading the racks in the order in which they were loaded all the bricks get 24-hour indoor curing. They are then cured out-of-doors for at least 21 days before they are sold.

At the start most of the bricks were sold for home foundations and for chimneys on wooden buildings, but architects, contractors, home owners, etc., have now become "sold" on this product and are using it for entire structures. The bricks are now accepted for almost all types of construction and meet A.S.T.M. and other specifications. Their compressive strength averages 2,600 pounds per square inch of gross area and the modulus of rupture averages 495. The dry weight of a brick is 4.22 pounds. The absorption in 70 degree F. water in 5 hours averages 7.70 per cent.

Workman dumping a barrow-load of aggregates into the skip.

The demand has been mainly for single bricks and there is no demand for waterproofing. Plain bricks are in the greatest demand, but some solid-color bricks have been sold. A Colorcrete spray gun also makes possible the manufacture of surface-colored bricks.

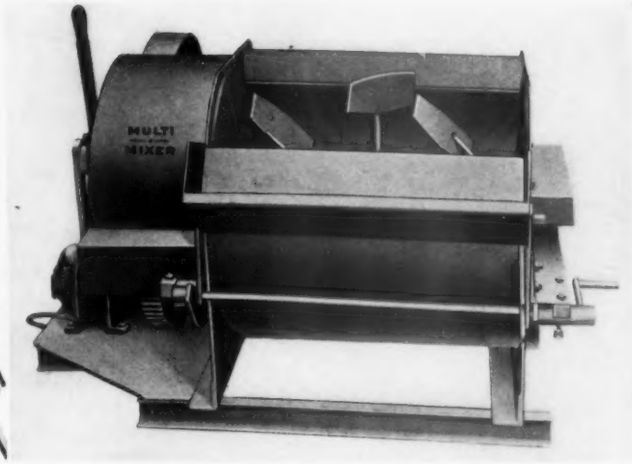
Dump-truck discharging aggregates at the plant

"LAST NOTCH CONTROL" in Concrete Mixing

LOW PRODUCTION COSTS

MULTIPLEX
MULTI-MIXER

HIGH MIXING SPEED



- All-steel, welded frame
- Enclosed drive gears running in oil
- Shafts mounted on roller bearings
- No costly clutches or belts to replace
- End discharge door gives access at all times
- New design mixing paddles for quicker mix

You can "go the limit" in high production and low costs when you use the Multi-Mixer in making quality concrete. Less wear to liners and blades. Lower HP rating. End, bottom or side discharge. Gives a better mix in less time. Capacities 5 to 40 cu. ft. and larger.

Write for Catalog describing our complete line of concrete products equipment—Tampers, Power Presses, Hand Press machines, and Variable Speed Vibration machines.

The *Multiplex* CONCRETE MACHINERY CO. ELMORE, OHIO

SAUERMAN LONG RANGE MACHINES

where there's work to be done *economically* . . .

SAUERMAN Machines are first choice for large scale economy, permanent dependability, and low cost operation in handling materials — effectively digging, hauling, and placing sand, rock, and gravel at distances from 100 ft. up to 1500 ft.

Above is illustrated applied SAUERMAN economy—a small, inexpensive scraper installation that stock-piles crushed silica on the ground alongside washery and reclaims this stored material in required quantities to drying plant.

The free SAUERMAN Catalog is yours for the asking. Write today for this well illustrated, comprehensive, and authoritative book.

SAUERMAN BROS., Inc.

434 S. Clinton St. Chicago, Ill., U. S. A.

Only Jaeger Truck Mixers Give You These Features . . .

- **DUAL-MIX ACTION** produces higher strength concrete— as proved by the Hollister Tests !
- **THROW-BACK BLADES** — essential to fast, thoro mix. Only Jaeger has them !
- **DUAL-REVOLVING WATER SPRAYS** — fastest water distribution; sprays to both ends of drum !
- **SYPHO-METER TANK** — insures accurate water control !
- **VACUUM CAB CONTROL** of shock-proof, 2-speed transmission — choice of truck engine or separate engine drive !
- **COR-TEN STEEL** — lighter, stronger, resists both rust and abrasion !

Send for new catalog showing why Jaeger Truck Mixers far outsell all others.

THE JAEGER MACHINE CO.

602 DUBLIN AVE., COLUMBUS, OHIO

MORE PROFITS

LOWER COSTS

THE KIRKHAM VIBRATOR

Makes dense-strong-weather-proof concrete blocks

Positive Vibration

Compact Portable

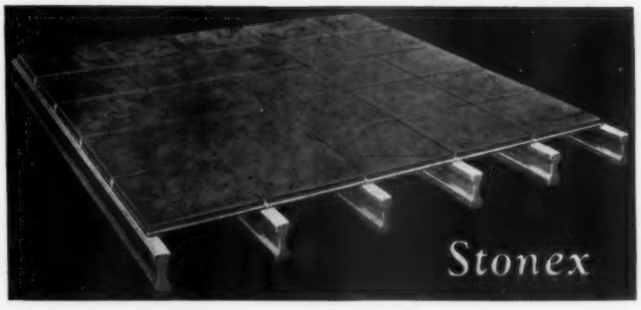
Economical operation

Plain wooden or steel pallets

Mold boxes changed in a few minutes

CONCRETE TRANSPORT MIXER COMPANY

660 ROSEDALE AVE. ST. LOUIS, MO.



HERE'S A NEW CONCRETE FLOOR

Precast concrete joists open the door to the low-cost floor market. STONEX clinches the sale by solving the problem of a floor finish.

The new and exclusive STONEX process enables products manufacturers to produce—at low cost—tile of all shapes, sizes, and for all purposes . . . tile that are harder than granite, as proved by laboratory tests . . . in beautiful colors; all shades, tones and blends, that are an integral part of the tile itself.

The system has been perfected and proved by test and job experience. It is all ready for alert products manufacturers to merchandise. It is just what you need to win your local floor business. *Write today for more details about STONEX process and our plan to license manufacturers to make and sell this system.*

STONEX INDUSTRIES

210 Seventy-First Street, Miami Beach, Florida

"YOU TOO CAN RING THE BELL FOR PROFITS"

WITH THE JACKSON CONCRETE BRICK MACHINE

NO PALLETS: The concrete is compressed so firmly that the bricks are removed by hand and piled on top of each other on flat-deck, lift-truck platforms or cars each holding 1,000 brick (this simplifies production tallies).

CHEAPER PLATFORMS: Since no pallets are used, the expensive tier type platform is done away with and only a flat deck platform is required. By setting a rack on top of these platforms, they can be used for concrete blocks. This does away with two sets of platforms where both brick and block are being manufactured.

LOW FIRST COST: Because cheaper platforms are used and no pallets are needed, the first cost is considerably lower with a Jackson brick machine installation.

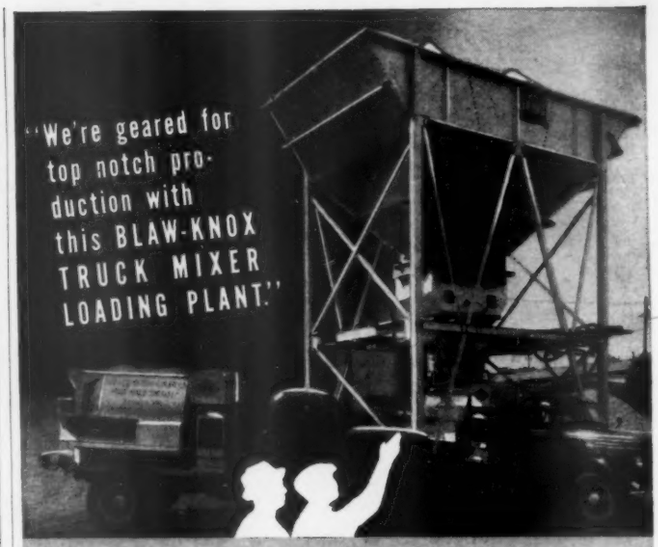
LOWER OPERATING COSTS: Because no pallets are used a great deal is saved in handling and maintaining thousands of pallets as well as providing storage space for them when not in use.

HIGH PRODUCTION: Up to 14,000 brick in an eight hour day can be made on the Model "C" brick machine which has six pocket molds in the rotary table. The Model "A" brick machine, which has twelve pocket molds, produces up to 28,000 bricks a day. This is by far the fastest producing concrete brick machine on the market today.

CLEAN, SHARP-EDGED BRICK: Because the brick are picked off the top of the plungers as they are forced up through the table pocket, they retain all of their clean cut sharp edges, thus making good looking and more salable brick.

WRITE TODAY FOR ILLUSTRATED FOLDER

JACKSON & CHURCH CO.
SAGINAW, MICH.



Blaw-Knox is the only manufacturer offering complete equipment for ready mixed concrete, including Trukmixers and Agitators, Ready Mixed Concrete Plants and Truck Mixer Loading Plants of all capacities and types.

Send for Blaw-Knox Catalogs Nos. 1566 and 1582.

BLAW-KNOX DIVISION of Blaw-Knox Company
FARMER'S BANK BUILDING PITTSBURGH, PA.

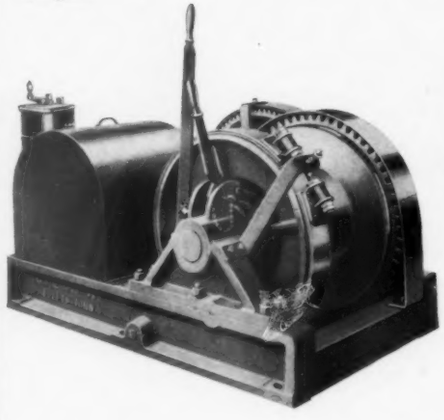
BLAW-KNOX *Truck Mixer* **LOADING PLANTS**

CLYDE CAR PULLERS

Save time and money around your plant by installing husky, dependable Clyde Electric Car Pullers.

Cars can be spotted quicker and cheaper . . . no costly maintenance of a switch or yard engine . . . no delays.

Clyde drum type car pullers are made in 13 sizes with a range of capacities to pull loaded cars up to 1,400,000 pounds. Two styles of vertical capstans are also available with pulling capacities to move cars up to 1,250,000 lb. weight.



CLYDE

You'll Take PRIDE In Your CLYDE

Consult our engineering department for further details and recommendations.

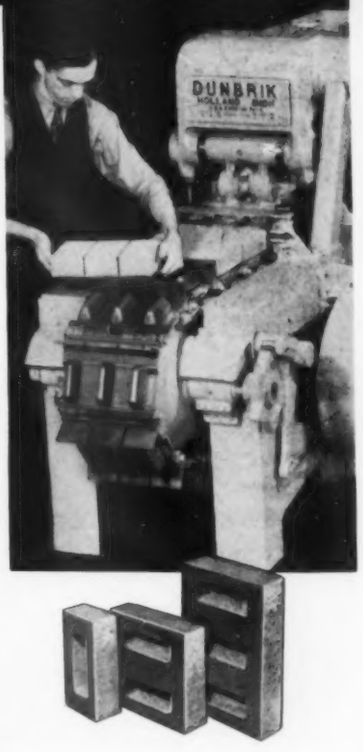
CLYDE IRON WORKS, Inc.
Duluth, Minn.

PROVEN EARNING POWER

When DUNBRIK Manufacturers show sales of three million brick per year with production costs as low as $5.00 per thousand—others with selling price of 100% over cost—proves the great earning power of this line-production brick machine.

These enviable records are the result of producing a superior product,—lighter weight, greater strength, lower absorption, absolute accuracy, and with true corners. In addition, multiple sizes of standard brick (DUNSTONE) can be produced that permit hollow, insulated wall construction at cost level of frame.

Write today for new book "4 Keys to Success" and learn about this wonderful machine, permitting large production with only one or two men and costing but a fraction of what would be required for other processes of equal capacity.



DUNTEX ROOF TILE MACHINE

With this machine you can dominate the vast roofing material market with a product unequalled in value, permanence, beauty and fire-safety. Your manufacturing costs are low, investment moderate, and selling prices offer attractive profit.

Send today for "DUNTEX Survey"

W. E. DUNN MFG. CO.
420 W. 24th St. Holland, Michigan

5 SMITH-MOBILES are Mixing Concrete for large Chicago U.S.H.A. Project!

And here are some reasons why —

1. High discharge makes possible discharging into portable 2 cu. yd. hoppers, for cart delivery, without using ramps or rear end hoists.
2. Feed chute charging, with no hatches to open or close, saves several minutes charging time per batch.
3. Efficient end-to-end mixing action insures uniform, well-mixed concrete on the unusually short hauls.
4. Visible Mixing permits visual inspection before discharge.
5. Fast discharge without segregation. Batch is discharged in about 45 sec.

• • •

That Thompson-Starrett Company, Inc., were wise in selecting SMITH-MOBILE Truck Mixers for this job is reflected in the fact that all five machines have been working steadily, for five months, *without a single mechanical failure.* Although the longest haul from the batching plant is only five city blocks, the strength of the concrete consistently exceeds the designed strength by 20%.

Write today for catalog.

THE T. L. SMITH COMPANY
2887 N. 32nd St. • Milwaukee, Wisconsin

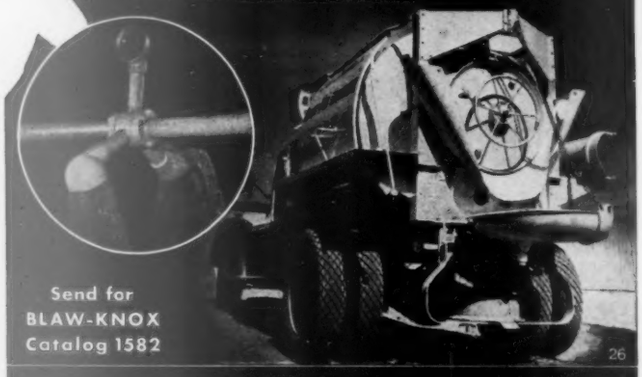
SMITH-MOBILE THE *Modern* TRUCK MIXER and AGITATOR

A 3025-½H

FAST WATER!

"MAN... That new WATER IMPELLER in BLAW-KNOX TRUKMIXERS puts water into the batch in one-third the time formerly required."

The new, fast water impeller that won't clog; an accurate and dependable water measuring system; superb mixing action—and assurance of dependable continuous operation make Blaw-Knox Trukmixers the popular choice, and the practical buy for you. Study these features before you decide.



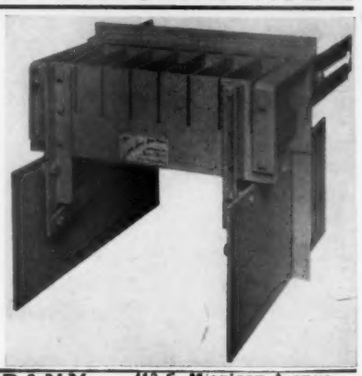
Send for BLAW-KNOX Catalog 1582

BLAW-KNOX BLAW-KNOX DIVISION OF BLAW-KNOX CO. Farmers Bank Bldg. Pittsburgh, Pa.

Agitators and **TRUKMIXERS**

LITTLE DAVE BRICKMAKER

Let LITTLE DAVE get you a profitable share of the brick business. He will pay for himself in one week in your plant. He makes 3000 smoothly troweled, sharp-edged brick per day also double brick, triples, etc. Now is the time to put LITTLE DAVE to work. Write for details —TODAY!



R. F. REED COMPANY 412 E. Michigan Avenue THREE RIVERS, MICHIGAN

Lewistown Foundry Products ARE

Performance-Tested

BUCKET ELEVATORS
REVOLVING SCREENS
CRUSHERS DRY PANS

Lewistown Foundry & Machine Co.
Lewistown, Pa.

Miles CONCRETE EQUIPMENT

INVESTIGATE BEFORE YOU BUY

the PIONEER EQUIPMENT of the industry, not an experiment, but a proven success with which you are assured a larger production of high quality blocks at both a lower first cost and a lower operating cost, facts well worthy of your serious consideration.

WRITE FOR CATALOG

THE MILES MANUFACTURING CO.
Dept. 20
JACKSON, MICHIGAN

START A NEW BUSINESS

This shows one of our Multiple Molds for casting 8x8x16" concrete blocks. We manufacture a complete line of Multiple Molds for blocks (both Rockface and plain), for brick, veneer blocks, etc. We are also owner and originator of the ZAGELMEYER SYSTEM of granite veneer for blocks.

Make **ZAGELMEYER** *Waterproof Concrete Blocks*

A Start May Be Made With as Little as $500.00

The Zagelmeyer System produces a block that no other system can equal. Many good territories open. Write today for further information.

Zagelmeyer Cast Stone Block Machinery Co.
502 S. Henry St. BAY CITY, MICH.

"I'm probably the youngest shovel operator that ever swung a dipper stick—but already PIT AND QUARRY is my favorite magazine."

GO WHEREVER the JOB IS..WITH the STRAYER CONCRETE PLANT

COSTS LESS THAN A TRUCK MIXER — the Strayer PORTABLE CONCRETE PLANT — 3 SIZES ½ YD. · ¾ YD. · 1 YD.

Expand YOUR CONCRETE MARKET PROFITABLY

TRUCK MIXER MARKET LIMITED BY DISTANCE

Here is an *extra arm* that will reach out beyond the economical range of your present Transit Mixer Market. You can be prepared for big yardage far away as well as small yardage close by. You can choose the more profitable method.

One operator used Strayer Plant performance to land a big concrete project over 100 miles away—won the contract—bought a Strayer Portable Plant—finished the jobs on schedule and made a neat profit. This experience, as well as many others, are described in a large folder that tells all. Get the complete story on this fast profit-maker.

ERIE STEEL CONSTRUCTION CO., ERIE, PA.

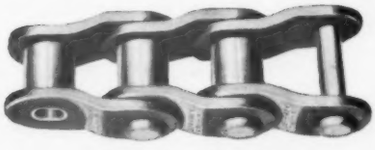
STRAYER PORTABLE CONCRETE PLANT

TRANSMISSION MACHINERY

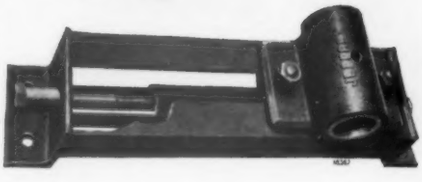
CHAINS
COLLARS
COUPLINGS
CLUTCHES
TAKE-UPS
SHAFTING
PULLEYS
GEARS

•

Also belt idlers, spiral flights and troughs, boots, buckets, car pullers, portable loaders and conveyors.



S. T. R. CHAIN



Send for Literature

The Jeffrey Manufacturing Company

917-99 North Fourth Street, COLUMBUS, OHIO

QUINN PIPE FORMS

HAND or WET PROCESS

Make concrete pipe on the job with *Quinn Pipe Forms.* Quinn Pipe Forms can be handled by less experienced labor and produce uniform concrete pipe of highest quality. The recognized standard of all concrete pipe.

HEAVY DUTY CONCRETE PIPE FORMS

Built to give more years of service—sizes for any diameter pipe from 12 to 84 inches—tongue and groove or bell end pipe — any length. Backed by years of service in the hands of contractors, municipal departments and pipe manufacturers.

NEW MEDIUM DUTY CONCRETE PIPE FORMS

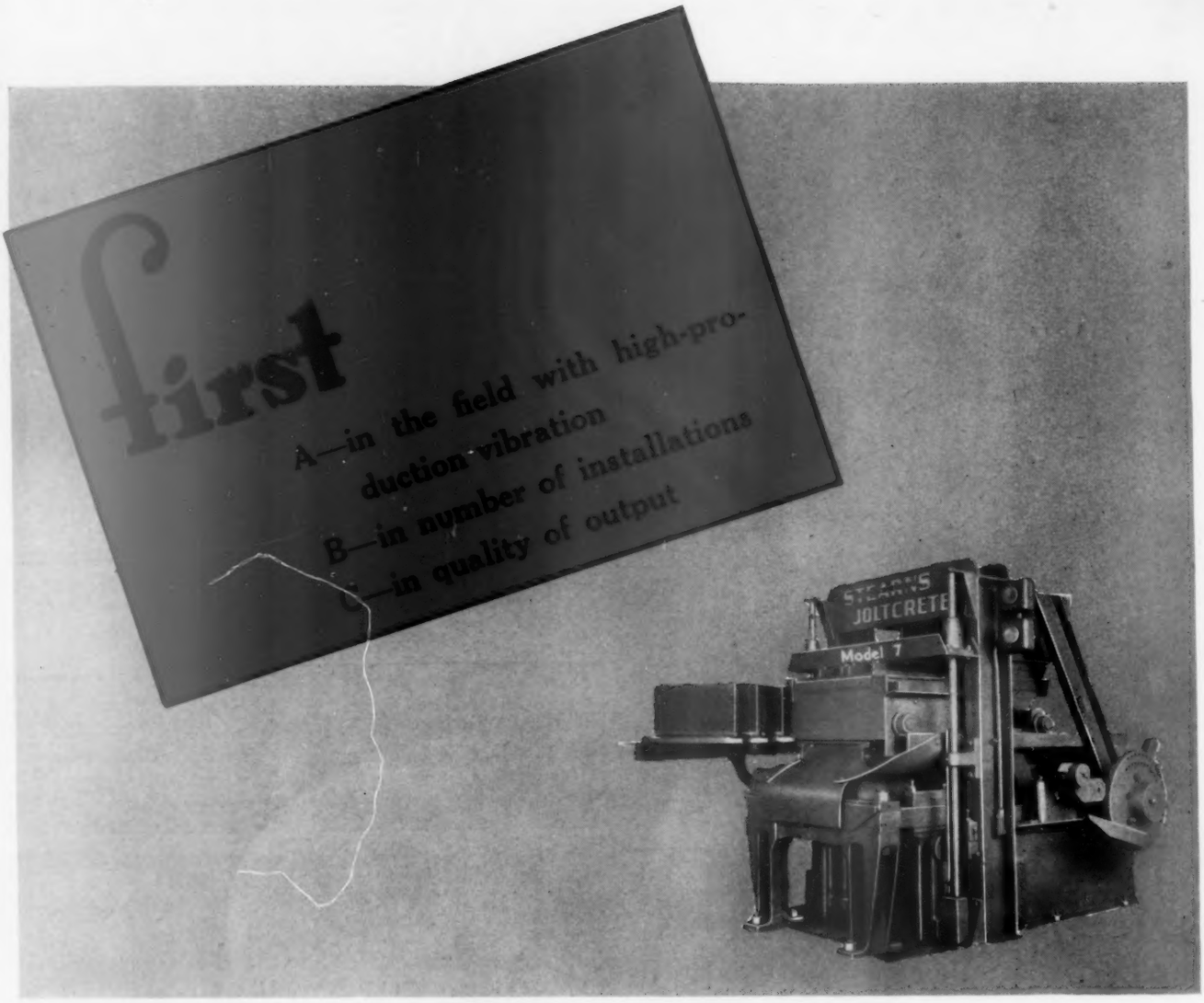
Meet the demand for low cost equipment that produces a uniform quality of pipe in smaller amounts. Complete in every way. Stands up on any job. Same sizes as "Heavy Duty," from 12 to 84 inches—any length.

Write Today

Get complete information on prices and Special Construction features of Quinn Pipe Forms. Give us size of job for estimate on your pipe form needs.
Also manufacturers of concrete pipe machines for making pipe by machine process.

QUINN WIRE & IRON WORKS

1627 TWELFTH ST., BOONE, IOWA



STEARNS JOLTCRETE

What it means to YOU

A. Having been first—by more than two years—gives Stearns Joltcrete that invaluable advantage that can come only from long experience in actual production. And the credit for pioneering further strengthens the broad, basic patents under which Stearns Joltcrete is built—**Limited Amplitude Vibration—Vibration Under Pressure.**

B. More than 100 Stearns Joltcretes are in successful operation. This is many times the total of all other high production vibration machines combined. Thirteen of these installations are repeat orders. All these leading products manufacturers can't be wrong!

C. No one questions the quality of the Stearns Joltcrete blocks. Other units may look quite similar but **only** Stearns Joltcrete blocks have been proven by extended, authoritative tests (the famous Wisconsin tests). This superior quality is the result of the patented principles employed in the machine, plus the use of cored pallets.

"We bought Joltcrete machines because this is the only high production machine we know of, permitting the use of cored pallets, which we insist upon." Spickelmier Fuel & Supply Co., Indianapolis, Indiana.

Buy a machine of *proven* worth! Ask for Stearns Joltcrete Folder.

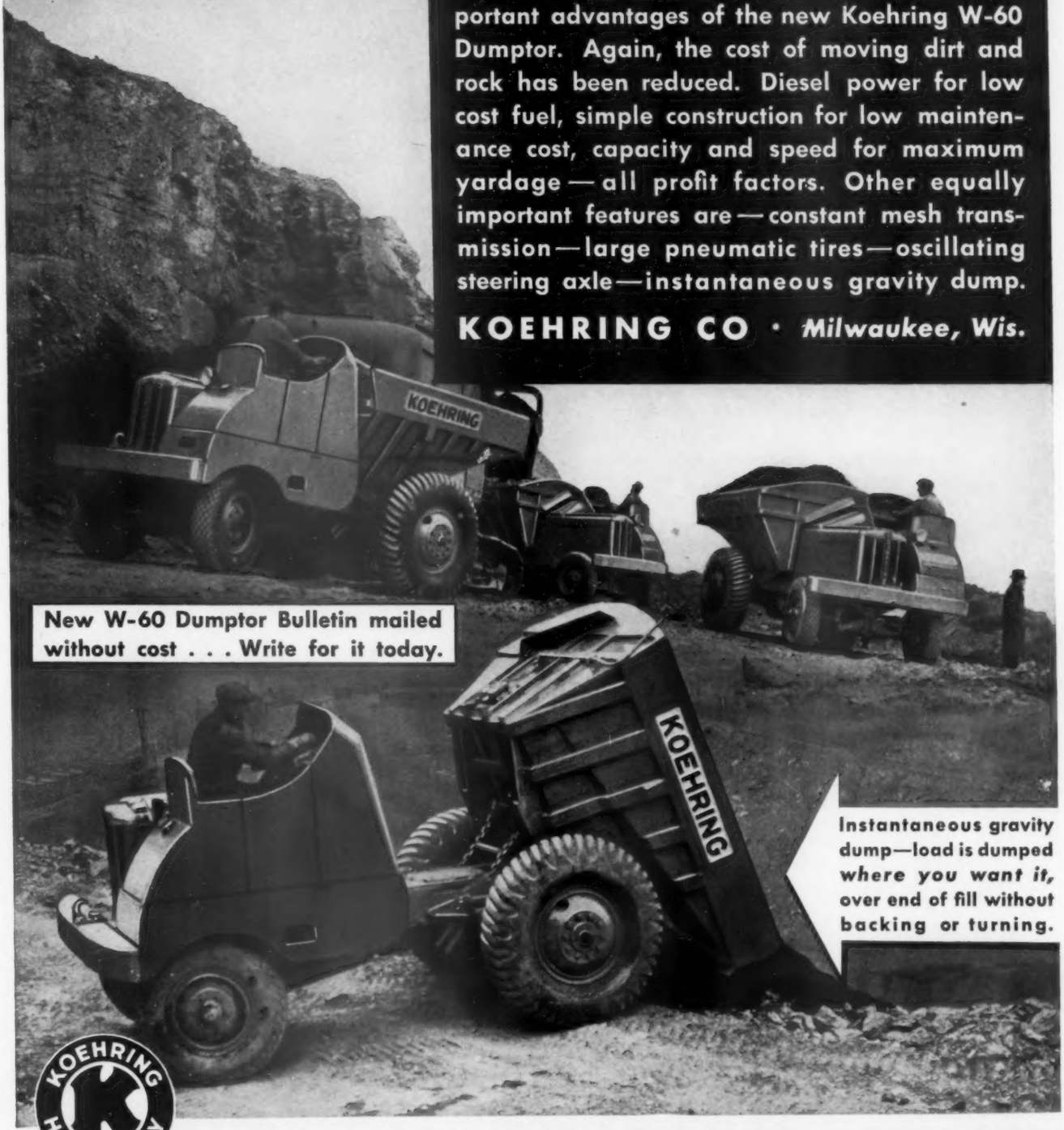
STEARNS MANUFACTURING CO. GENE OLSEN President ADRIAN, MICH.

DIESEL DUMPTOR

MORE SPEED · POWER · CAPACITY

Speed, power and capacity are the three important advantages of the new Koehring W-60 Dumptor. Again, the cost of moving dirt and rock has been reduced. Diesel power for low cost fuel, simple construction for low maintenance cost, capacity and speed for maximum yardage — all profit factors. Other equally important features are — constant mesh transmission — large pneumatic tires — oscillating steering axle — instantaneous gravity dump.

KOEHRING CO · *Milwaukee, Wis.*



New W-60 Dumptor Bulletin mailed without cost . . . Write for it today.

Instantaneous gravity dump—load is dumped *where you want it,* over end of fill without backing or turning.

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

Getting Salesmen's Co-operation

Tying in Advertising with Selling

Getting out into the field

Copy Testing

DIRECT MAIL

Layout, Copy and Illustration

Market Information

contributing to the solution of general company problems

Readership of Publications

Measuring Results

ALLOCATION OF BUDGETS

Programs that management will approve

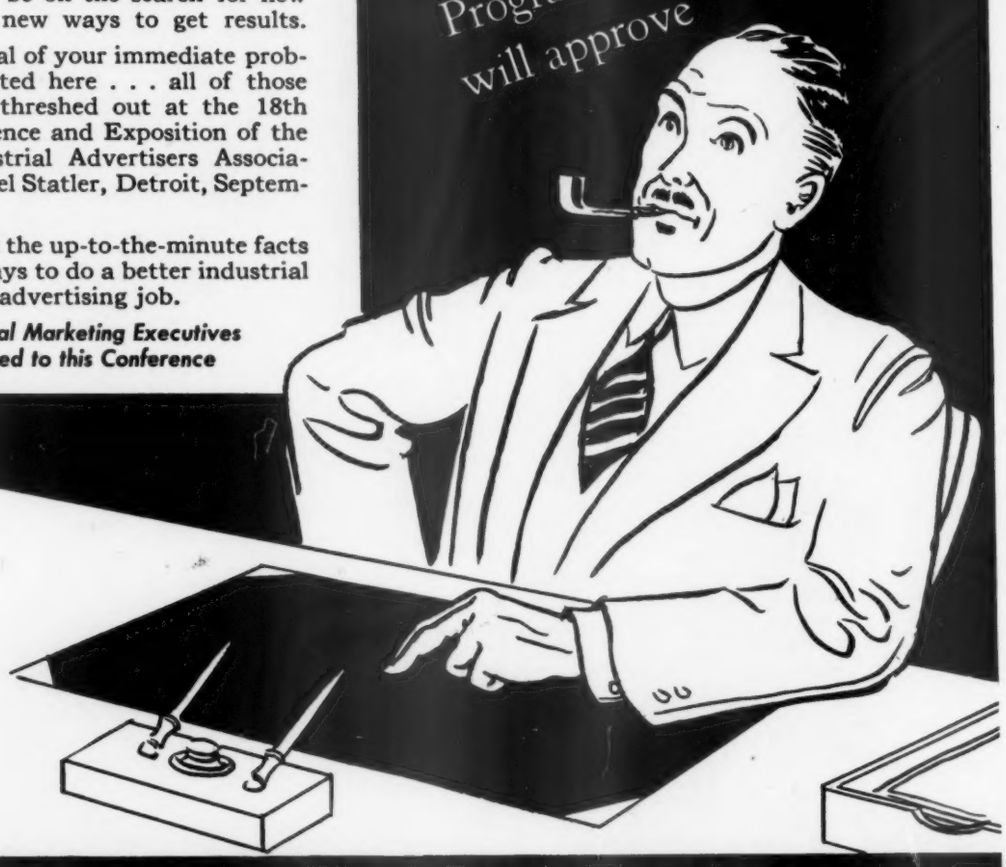
WHAT'S YOUR PROBLEM?

Your business . . . in at least one respect . . . is no different from others: *Your marketing problems are constantly changing.* You must ever be on the search for new ideas . . . for new ways to get results.

No doubt several of your immediate problems are indicated here . . . all of those shown will be threshed out at the 18th Annual Conference and Exposition of the National Industrial Advertisers Association, at the Hotel Statler, Detroit, September 18, 19, 20.

Plan now to get the up-to-the-minute facts on the latest ways to do a better industrial marketing and advertising job.

All Industrial Marketing Executives are Invited to this Conference



NIAA
NATIONAL INDUSTRIAL ADVERTISERS ASS'N

1940 INDUSTRIAL ADVERTISING CONFERENCE

DETROIT . . . HOTEL STATLER . . . SEPTEMBER 18, 19, 20

POWER

EXTRA POWER AT LESS COST

Have you a hauling job that calls for extra power? For a little more than $600 plus taxes, delivered at the factory, you can have a Ford 95-horsepower Truck, and be sure you get the job done at low cost. To get as much horsepower in any other truck, you would have to pay almost $300 more.

You can depend on this Ford 95-horsepower Truck. Back of it is the company which has built more trucks than any one else. Truck specialists designed the Ford "95" to do the tough jobs—and it is doing them in practically every line of hauling.

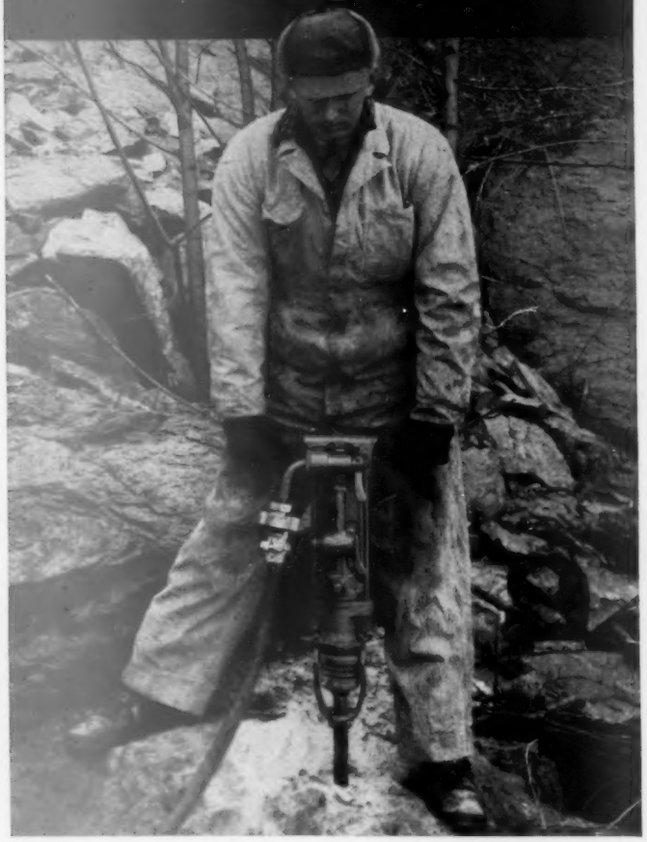
Do you want extra power and high speed — with a lot of what it takes under all kinds of loads and all kinds of roads? Then it will pay you to talk with the Ford dealer today about the Ford V-8 95-horsepower Truck.

Ford

FORD 95-HP TRUCKS

FORD MOTOR COMPANY, BUILDERS OF FORD V-8 AND MERCURY CARS, FORD TRUCKS, COMMERCIAL CARS, STATION WAGONS AND TRANSIT BUSES

THIS IS THE SINKER for Quarry Service



For sinker drilling around the quarry, there isn't a better sinker drill than the CP-42. Its high speed, strong rotation, good hole cleaning capacity and low air consumption make it a quick-drilling, economical tool. Its maintenance cost is very low because it is sturdily built, fully cushioned and automatically lubricated. Why not arrange for a demonstration of CP-42 Sinker on your job.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 6 EAST 44th STREET, NEW YORK, N. Y.

Sales Offices and Service Stations Throughout the World

CP ROCK DRILLS

NAYLOR

the Light-weight Pipe for High and Low Pressure Lines!

Here's the kind of performance that has made Naylor the one light-weight pipe ideally suited for high or low pressure lines.

Naylor's exclusive Lockseam Spiralweld structure makes it leak-tight, flexible, stronger and safer than ordinary light-weight pipe.

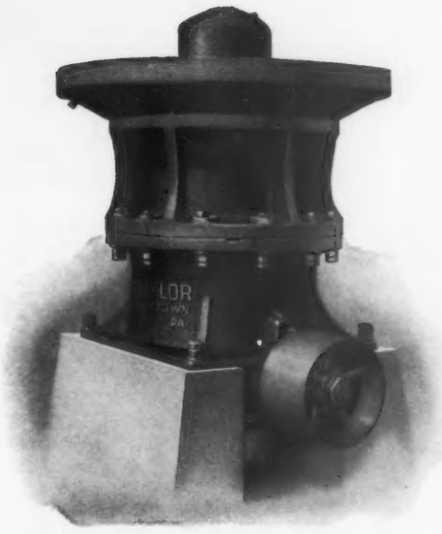
Sizes from 4" to 30" in diameter meet every requirement. All type fittings and connections. Complete fabrication service helps cut your installation costs.

• WRITE FOR CATALOG No. 37

NAYLOR PIPE COMPANY

1257 EAST NINETY-SECOND STREET

CHICAGO, ILLINOIS



Our Type H Jaw Crusher (Bulletin 1105) and our Multi-Stage Reduction Crusher (Bulletin 113) are worth looking into!

the "TY" has what it takes!

The STRENGTH of a cast steel frame; LARGE CAPACITY, assured by patented Bell Head and Curved Concaves; LOW POWER cost, due to the elimination of packing; ECONOMY of maintenance, due to scientific lubrication and dust exclusion.

Every dollar paid for,—and spent upon,—a Traylor Type TY Reduction Crusher returns full value,—AND A PROFIT,—to its owner. The "TY" has proved its worth to more than three hundred operators, and it can do the same for every operator, given the chance!

Send for our Bulletin 2112 and learn all about this machine, or, if preferred, our representative will call and tell the story!

TRAYLOR
ENGINEERING & MANUFACTURING CO.
MAIN OFFICE AND WORKS — ALLENTOWN, PENNA., U.S.A.

NEW YORK CITY 3916 Empire State Bldg. **CHICAGO** 815 One La Salle St. Bldg. **SALT LAKE CITY** 101 West Second South St. **LOS ANGELES** 919 Chester Williams Bldg. **SEATTLE** 6311-2nd Ave. N. E.

B. C. EQUIPMENT CO., LTD. 551 Howe St., Vancouver, B. C. **MANILA MACH. & SUPPLY CO., INC.** Manila and Baguio, P. I. **MAQUINARIA INTERNACIONAL, S. R. L.** Av. Francisco I. Madero No. 17, Desp. 214, Mexico, D. F.

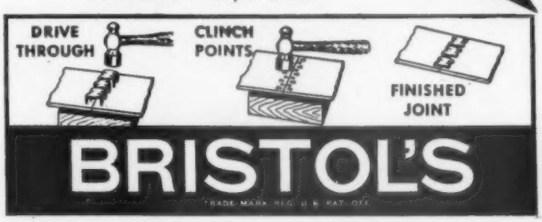
Export Department—104 Pearl St., New York City. Foreign Sales Agencies: London, Lima, Sao Paulo, Rio de Janeiro, Buenos Aires, Santiago, Valparaiso, Antofagasta, Oruro

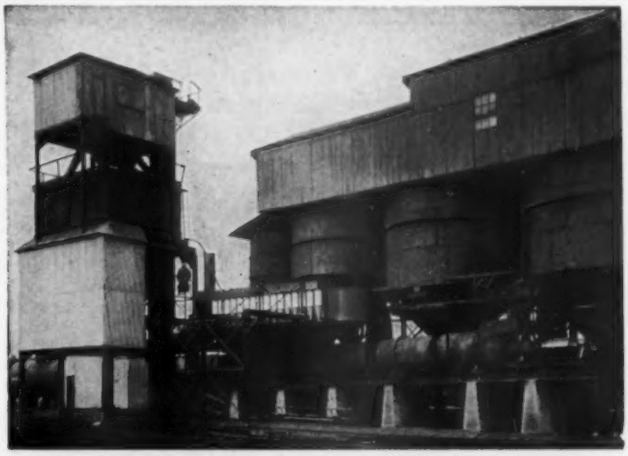
BELTS fastened with Bristol's Steel Belt Fasteners will not tear apart or loosen up at the joint . . . and here is the reason. The specially designed Bristol's points pass through the fibre or fabric without cutting or tearing. Since the fasteners are of cold rolled steel, once clinched in place they keep their shape. Even in severest belt service, these superior fasteners hold with a lock-tight grip.

For the quickest, easiest joints and repairs you ever made . . . specify Bristol's. Free samples and Bulletin 72-5W gladly sent on request. Write.

The Bristol Company, *Mill Supply Division*, Waterbury, Conn
Branches in Principal Cities.

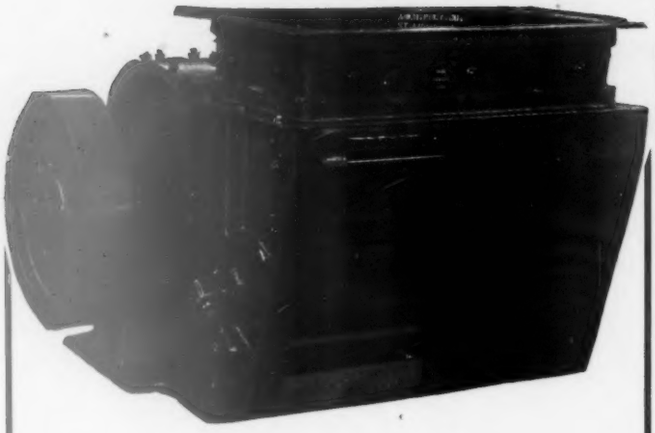
SEE HOW EASY IT IS!





WARREN ASPHALT PLANTS
HOT MIX —— COLD MIX
— OR —
COMBINATION UNIT FOR BOTH TYPES
CAPACITY DESIGN AND ARRANGEMENT TO MEET ANY REQUIREMENTS

Designed and Built
— By —
WARREN BROTHERS ROADS CO.
P. O. BOX 1869
Boston Massachusetts

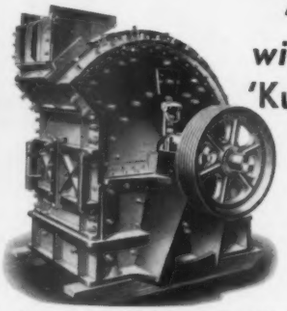


AMERICAN CRUSHERS
serve....continuously!

It's the ability of AMERICAN Ringmills and Hammermills to deliver 10 to 100 tons per hour . . . *continuously* . . . that makes these machines so popular everywhere. This *continuous*, trouble-free service, combined with the delivery of a uniformly-sized product free from chips and slivers, can end your reduction worries, too. Get the facts from this 30-year-old concern today!

AMERICAN PULVERIZER COMPANY
1289 MACKLIND AVE. ST. LOUIS, MO.

PRODUCE BETTER AGGREGATE
AT LOWER COST
with the Cedarapids 'Kubit' Impact Breaker



- REDUCES PERCENTAGE OF ELONGATED PIECES.
- PRODUCES ALMOST 100% FRACTURED MATERIAL.
- MAKES SMALLER SIZES WITH LESS WASTE.
- PRODUCES A BETTER GRADATION OF AGGREGATES

Licensed Under U. S. Patent No. 1996485
Write for Bulletin K-1
IOWA MFG. CO. CEDAR RAPIDS, IOWA

ROUND
SQUARE
SQUAROUND*
HEXAGON
PERFORATED
PLATE
of every description
for maximum productiveness from your vibrating screens.
*Reg. U.S. Pat. Off.

HENDRICK MANUFACTURING CO.
39 Dundaff Street, Carbondale, Pa.
Sales Offices in Principal Cities. Please Consult Telephone Directory

LUDLOW-SAYLOR
CONTROLLED-TEMPER SUPER-LOY
WOVEN WIRE SCREENS
for super-severe service

SUPER HARD, SUPER TOUGH, SUPER STRONG
CONTROLLED TEMPER SUPER LOY SCREENS
withstand abrasion longer—endure vibration better—resist fatigue to the utmost

LUDLOW-SAYLOR
WIRE CO. ST. LOUIS

BETTER SERVICE

JAW AND ROLL CRUSHERS
VIBRATING AND ROTARY SCREENS
BELT—FLIGHT—APRON CONVEYORS
ELEVATORS—BINS
Literature on Request

DIAMOND Vibrator Screens are built in single or multiple decks to meet any size demands. Full roller bearings. Flexible hanger or cable suspension. Rugged construction. Low power and maintenance cost.

DIAMOND IRON WORKS INC.
AND THE MAHR MANUFACTURING CO. DIVISION
MINNEAPOLIS, MINNESOTA, U. S. A.

MANHATTAN
MANHATTAN RUBBER PRODUCTS for Industry

Condor PRODUCTS for Mine and Quarry

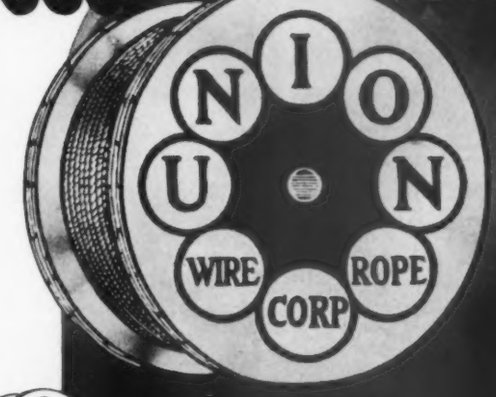
	Steam Hose	Transmission Belt
	Suction Hose	Conveyor and Elevator Belt
Air Hose	Sand Blast Hose	Industrial Brake Blocks
Water Hose	Abrasive Wheels	and Lining

THE MANHATTAN RUBBER MFG. DIVISION
OF RAYBESTOS-MANHATTAN, INC.
18 TOWNSEND STREET, PASSAIC, NEW JERSEY

Advertise your wants and surplus equipment in

The Sign of a

GOOD DISTRIBUTOR



UNION *Wire Ropes*

"ULTIMATE LOW COST WIRE ROPE"

THIS PORTABLE VIBRATING SCREEN

Accurately separates 3 sizes of 100 tons of material per day using only the power of a 2 H.P. gas engine or a 1 H.P. electric motor. Self-contained, easily moved. The Contractor's Screen is ideal for road and construction work, concrete block machinery, cleaning and sizing in small quarries and factories.

Send for new bulletin "CONTRACTOR'S SCREEN." It may help reduce your cost of screening.

ROBINS CONVEYING BELT COMPANY
PASSAIC, NEW JERSEY

Offices in Principal Cities

MATERIAL HANDLING ROBINS EQUIPMENT

Keep your conveyor belts going with

FLEXCO

HD BELT FASTENERS

• **FLEXCO H D RIP PLATES** are used in repairing rips and patching conveyor belts. The wide space between outer bolts gives the fastener a long grip on the edges of the rip, while the center bolt prevents the fasteners from bulging.

• Avoid shutdowns and lengthen the life of your conveyor belts and bucket elevator belts by using Flexco HD belt fasteners and rip plates. Thousands of companies have stepped up the performance of conveyor lines and cut costs by using Flexco methods.

• **FLEXCO H D BELT FASTENERS** make a strong, tight butt joint with long life. Recessed plates embed in belt, compress belt ends and prevent ply separation. Five sizes in steel and alloys.

Bulletin F-100 shows exactly how to make tight butt joints in conveyor belts with Flexco HD Belt Fasteners. Also illustrates step by step the latest practice in repairing rips and putting in patches.

Write for your copy

FLEXIBLE STEEL LACING COMPANY
4623 Lexington St., Chicago

FLEXCO HD BELT FASTENERS
Sold by supply houses everywhere

CUMMER ASPHALT PLANTS

COMBINATION HOT AND COLD MIX PLANTS
Using the Combination Two Fire Dryer Cooler.

HOT MIX PLANTS
Using the new Cummer Internal Fire Dryer.

DRYERS
Combination Two Fire Dryer Cooler
The New Cummer Internal First Dryer
(1 machine)

STEAM JACKETED ASPHALT BUCKETS
Stationary, bottom discharge type.

VIBRATING SCREENS
Cummer-Robins inclined type for any make or size of asphalt plant.

MIXERS
400 to 5000 pound batch, steam jacketed, with the new mixer teeth adjustable for top or bindet without change.

Write for bulletins.

THE F. D. CUMMER & SON CO.
Cleveland Ohio
Builders of fine asphalt paving machinery since 1895

Pit and Quarry Helps You Operate More Profitably

Every issue of PIT AND QUARRY is full of information you can use in your business. It gives you practical ideas on every phase of your operations.

To keep its readers fully informed, PIT AND QUARRY taps every source. Our field editors travel more than 30,000 miles a year to describe the processes and methods used by the outstanding plants making your type of product. Government activities affecting the field are interpreted so that you can better adjust your business to their regulations. Complete reports of all important conventions are published in PIT AND QUARRY. The new equipment and supplies which may make production more efficient are announced in each issue.

Reading PIT AND QUARRY is like having a conference every month with the leading men in your industry. You don't have to stir out of your chair to get information that otherwise would take you years to obtain by your own efforts and experience.

The cost of this service is only $1 a year. Start your subscription at once by just filling and mailing the coupon below.

Return This Coupon To-day—Start Your Subscription with the June issue

PIT AND QUARRY PUBLICATIONS,
538 So. Clark Street, Chicago, Illinois.

Enclosed find remittance for which enter my subscription to Pit and Quarry for .....
1 year ($1.00) ..... starting with the June issue. (Foreign add $1.00 per year.)

My Name..... Title.....

Company Name .....

Send to (Address).....

We Produce.....

ROTARY KILNS
GRINDING MACHINERY
for cement, lime, ores, etc.

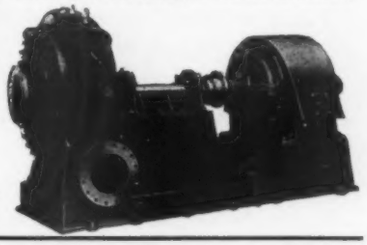
▼ ▼ ▼

F. L. SMIDTH & CO.

60 East 42nd Street New York, N. Y.

MORRIS
CENTRIFUGAL PUMPS

For hydraulic dredging, filling, sand and gravel production, hydraulic conveying of slurry and other liquids containing abrasive materials, clear water pumps for general service. Also complete dredges with all accessory equipment. Dredging pump designs include heavy-duty types and special alloy parts for severe service. Types and sizes for the largest or smallest operations, and for belt, motor, steam, oil or gasoline-engine drive.



Write for Bulletins

Morris Machine Works
Baldwinsville, N. Y.

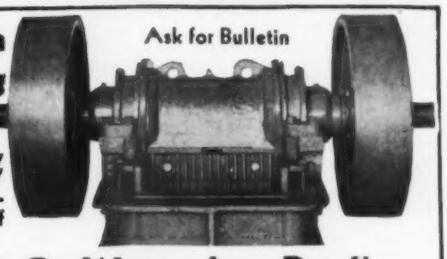
SIMPLICITY
GYRATING SCREENS
The Leader in Improved Screening
Available in Many Standard Sizes
For Any Aggregate Grading Job
"It's Guaranteed, without Reservation"

SIMPLICITY ENGINEERING COMPANY
DURAND, MICHIGAN

Crack Down on Crushing COSTS

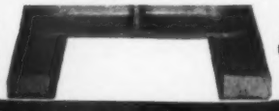
with the super-duty Roller Bearing DAY Crushers and Pulverizers. Wide range of sizes available.

Ask for Bulletin



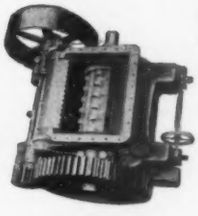
"You Can't Go Wrong in a Day"

Made by the builders of the famous Brooks LOAD LUGGERS



10 x 20 Jaw Type CRUSHER

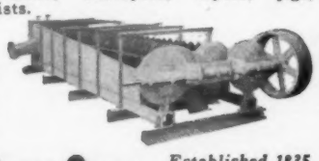
BROOKS EQUIPMENT & MFG. CO.
KNOXVILLE, TENNESSEE



McLANAHAN EQUIPMENT

CRUSHERS
Single and double roll and jaw crushers, hammer mills, super dry pans—steel log washers and scrubbers, sand drags, revolving and vibrating screens, elevators, conveyors, dryers, jigs, hoists.

SCREENS
Complete portable, semi-portable and stationary crushing, screening and washing plants for different capacities of any materials.



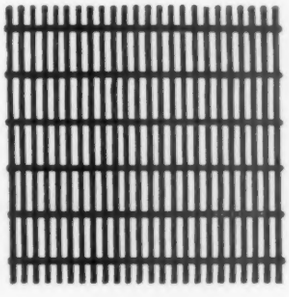
McLanahan & Stone Corp. *Established 1835* HOLLIDAYSBURG, PENNSYLVANIA

SYMONS
CRUSHERS • SCREENS

Meet today's demands for finer crushed products at lower cost by producing them with Cone Crushers.

For more accurate sizing, install the horizontal, positively vibrated, low headroom Symons Screen.

NORDBERG MFG. CO., MILWAUKEE WISCONSIN



Rolled Slot

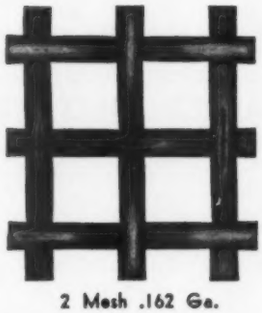
ALLOY No. 2

A super wearing Steel developed to resist the abrasion and vibration of modern screening demands.

"CLEVELAND" SCREENS

A wire cloth of guaranteed accuracy backed by fine workmanship and an effort to satisfy.

Available in Square Mesh and Rolled Slot. A trial will convince you of the superiority.



2 Mesh .162 Ga.

THE CLEVELAND WIRE CLOTH & MFG. COMPANY
574 E. 78th St. CLEVELAND, OHIO

BARGAIN PRICES

ON

RUBBER BELTING

TRANSMISSION—CONVEYOR—ELEVATOR

"V" BELTS

FOR

PUMPS—CRUSHERS—PULVERIZERS—ETC.

RUBBER HOSE

FOR

AIR—WATER—STEAM—ETC.

Partial Stock List

NEW AND HEAVY DUTY

Conveyor and Elevator Belting

Quantity	Width	Ply	Top Cover	Bottom Cover	Type
668 Ft.	36″	6	1/8″	1/16″	Conveyor
660 "	30″	6	1/8″	1/16″	"
245 "	26″	5	1/8″	1/16″	"
906 "	24″	5	1/8″	1/32″	"
298 "	24″	4	1/8″	1/16″	"
370 "	22″	8	1/16″	1/16″	Elevator
296 "	22″	8	Friction		"
1455 "	20″	5	1/8″	1/32″	Conveyor
403 "	20″	4	1/8″	1/16″	"
1738 "	18″	4	1/8″	1/32″	"
60 "	18″	8	1/4″	1/16″	Elevator
288 "	18″	6	1/8″	1/16″	"
712 "	18″	4	1/16″	1/16″	Conveyor
1096 "	16″	4	1/8″	1/32″	"
554 "	16″	4	1/16″	1/32″	"
738 "	14″	4	3/32″	1/32″	"
288 "	14″	4	1/8″	1/16″	"
110 "	12″	8	1/8″	1/16″	Elevator
226 "	10″	6	1/16″	1/16″	"

USED BELTING—Good Condition

470 Ft.	48″	8	1/8″	1/16″	Conveyor
210 "	20″	7	Friction		Elevator

We will cut any of above rolls. Advise desired lengths and widths and we will promptly quote prices. Many other sizes in stock for immediate shipment.

CARLYLE RUBBER CO., Inc.

62 Park Place New York, N. Y.

CRUSHERS

GYRATORY: 42″ McCully with 80% brand new parts. 36″ Allis-C. 20″ Super. McCully conv. to 16″. Gates Nos. 10, 9, 8, 7½, 6, 5, 4, 3, 2, 1 (75 avail.) Telsmith Nos. 4, 3, 2, 2C, B & 1A. Also many Austins, Kennedys and Traylors, many sizes.

JAW TYPE: Traylor 60x84, 48x60, 42x48, 24x72. Superior 84x66 & 24x36. Buchanan 30x42. Farrel 60x42, 30x36, 24x36, 18x36, 12x24. Good Roads 1030. Acme 24x40. Misc. 7x12, 9x16, 8x20, 8x24, 12x24, 9x36, 9x30, 15x36.

REDUC. TYPE: Kennedy Nos. 25, 37 & 49. Telsmith 3-F & 40. Traylor 36″ TZ, 8″ 10″ & 12″. Super. McCully 6″ & 10″. Newhouse 5, 7 & 10″. Symons Cone & Disc. Ty. 2′ to 4′.

ROLLS: Allis-C. 12½x12, 36x16, 40x15, 54x24 & 72x30. Fairmount 36x60 & Jeffrey 24x24 to 36x54 single roll. Cornish 36x14 & 42x16. Etc., Etc.

HAMMERMILLS: Williams Nos. 1, 2, 3, 4, 8 & 9. Jeffrey 36x18 & 36x42. Day Nos. 20 & 40, Etc.

MILLS: Kennedy Ball 4x6, 5x6 & 5x8. March 8x6 & 10x9. Hardinge 6′x3′, 8′x30″ & 8′x9′. Misc. Tube Mills 5′ & 6′x22′. Sturtevant Ring Roll, Raymonds, Kents, Fuller-Lehigh, Etc., Etc.

CRUSHING PLANTS: No. 65 Diamond. No. 22 Pioneer 8x24. 1030 Good Roads, 9x40 Austin-Western, 9x36 C.R.

MISCELLANEOUS ITEMS

Barges, Bins, Buckets, Boilers, Cableways, Cars, Compressors, Conveyors, Cranes, Dryers, Derricks, Draglines, Drag Scrapers, Dredges, Drills, Engines, Elevators, Excavators, Generators, Hoists, Kilns, Locomotives, Loaders, Motors, Pipe, Pumps, Rail, Scales, Screens, Slacklines, Shovels, Tanks, Trucks, Tractors, Etc., in many sizes, types and makes at low prices.

(I have equipment at many points in the United States and Canada. What you need may be near your plant.)

ALEX T. McLEOD

7229 Rogers Avenue CHICAGO

WANTED

1—(Used) Steel Building, equipped with overhead traveling crane, building having approximate dimensions of 80′ x 125′.
1—(Used) Steel Building, having dimensions of 80′ x 100′, with overhead traveling crane.
1—(Used) Steel Building, having dimensions of 100′ x 250′, with overhead traveling crane.

PHILLIPS MACHINERY CO.

9th and Cary Sts. Richmond, Virginia

WANTED

DERRICKS AND CRANE

30 or 40 Ton Steel Stiff Leg Derrick with 100 ft. boom.
20 Ton Steel Stiff Leg Derrick with 80-100 ft. boom.
35 or 40 Ton 8-wheel Locomotive Crane, Steam or Gas.

Give complete details first letter.
Send replies to
BOX 604

PIT AND QUARRY PUBLICATIONS

538 S. Clark St. Chicago, Ill.

SAVE

Bolted type steel bins will cost you less erected than ordinary wood bins.

New and Used Pipe and Tubing

Jos. Greenspon's Son Pipe Corp.
Natl. Stock Yds. (St. Clair Co.) Ill.

5½ FT. SYMONS CONE CRUSHER

Includes fine and coarse bowl.
Ready for immediate loading.
Also
N.W. Model 104 Crane and Drag—50′ boom, in rebuilt condition.

MATERIAL SERVICE CORPORATION

33 N. LaSalle St. Chicago Franklin 3600

RENT OR SELL

4—3-yard Rex Truck Mixers on Mack Trucks.
2—1½-yard Jaeger Truck Mixers — Ford mounted—Excellent condition.
7—4-yard Rex Truck Mixers mounted on Autocar and Mack Trucks—1937-8.
1—80 ton 2 compartment Blaw-Knox Bin.
Concrete Finishing Machine.
Rent new Diesel 315 Compressor and New Tools.

THE JAEGER-LEMBO MACHINE CORP.

127-04 Northern Boulevard
Corona, L. I., N. Y.
Phone: NEwtown 9-7777

Jaw Crushers—4″x8″ up to 66″x84″.
Crushing Rolls—16″x10″ up to 54″x24″
Gyratory Crushers—No. 3 up to Mammoth
Ring Roll Mills—No. 0, No. 1, No. 1½ and No. 2.
Swing Hammer Mills.
Rotary Fine Crushers—No. 0, No. 1, No. 1½ and No. 2.
Direct Heat Rotary Dryers—3½′x25′, 4′x30′, 5′x30′, 5½′x40′, 6′x50′, 7′x50′ and 8′x50′.
Semi-indirect heat Dryers—5′x30′ and 8½′x75′.
Cement Kilns—3′ up to 8′ diameter.
Hardinge, Marcy & Fuller-Lehigh Mills.
Raymond Mills—No. 00, No. 0, No. 1, No. 2 Roll.
2—6′x12′ and 1—4′x10′ rod mills.
Tube—Rod and Ball Mills—3′ to 6′ diameter.
Vibrating Screens—Air Separators.
1—4′x4′ and 8′x6′ ball mills.
New Dryers built for all purposes.

W. P. HEINEKEN

95 Liberty St., N. Y. Tel.: Barclay 7-7298

WANTED

Good Used Drill Steel Sharpener with Punch to Handle 1¼″ Steel.

R. S. ARMSTRONG & BRO. CO.
676 Marietta Street, N.W.
Atlanta Georgia

WANTED

ROTARY KILN

5′ x 75′ or 5′ x 100′.
For Shipment to Mexico.
Mail Complete Proposals to
BOX 612

PIT AND QUARRY PUBLICATIONS

538 S. Clark St. Chicago, Ill.

WANTED: SALES ENGINEER

Nationally-known firm manufacturing dust-collecting and related equipment seeks sales engineer familiar with Portland-cement industry. Real opportunity for right man. Outline experience and qualifications and mail to:

Box 608
PIT AND QUARRY PUBLICATIONS
538 S. Clark St. Chicago, Ill.

WANTED

Man for Cement Plant in Bolivia, S. A. General experience in plant operation especially in Burning. Apply to E. N. Gorman, P. O. Box 286, Church Street Annex, New York City, stating references, experience, and salary desired.

Advertise Your

"Wants" and Surplus Equipment

ROTARY KILNS AND DRYERS FOR SALE

ROTARY KILNS

2—8′ x 125′
5—6′ x 120′
5—6′ x 60′

ROTARY DRYERS

1—4′6″ x 50′ Direct Heat, double shell type.
1—4′ x 60′ Direct Heat, with ½″ shell.
3—6′ x 60′ Direct Heat.

All of these Kilns and Dryers are complete and still in operating position in the plant of the former Castalia Portland Cement Co. that we purchased in its entirety. Castalia is 60 miles West of Cleveland, and inspection at the plant is invited. Each of the kilns is equipped with firing hood, pulverized fuel bin, with feeder, etc.

BALL MILLS

2—5′x10′ BONNOT BALL MILLS, steel lined, each with 150 H.P. slip ring motor.

1—8′x30″ HARDINGE CONICAL BALL MIL. . .ron lined, with motor.

TUBE MILLS

5—5′x20′ and 5′x22′ TUBE MILLS, silex lined, steel heads, each with 150 H.P. slip ring motor.

5—5′x27′ TUBE MILLS, silex lined, roller mounted, each with 200 H.P. slip ring motor.

Some of the other good equipment still remaining at the Castalia Portland Cement Plant:

1—12′ dia. Phillips & McLaren Dry Grinding Pan.
300—1½ yd. Dump Cars, two-way, 36″ gauge.
4—18-ton Locomotives, Porter and Vulcan, 36″ gauge.
2—42″ Fuller-Lehigh Pulverizers, gear driven, incl. motors.
1—5-ton Traveling Crane, 70′ span, 300′ runway.
1—20 ton Browning Locomotive Crane.
800 Ft.—12″ and 1200 Ft.—9″ Screw Conveyor, all encased, various lengths.
Electric Motors: Total of 4000 Horsepower, incl. 6—200 H.P. and 7—150 H.P., all 600 RPM, 3/60/440 volts.

JUST ANOTHER MONTH! This equipment at Ely, Minnesota, must be sold quickly:

1—24x36″ All Steel Jaw Crusher.
2—8x36″ Universal fine reduction type Jaw Crushers.
8 Sets of Crushing Rolls.
60 Electric Motors, all 3/60/440 volts.
1—458 CFM. I-R Air Compressor, 100#. Incl. motor.
1—7x6 I-R. Type ER-1 Air Compressor.
1—1¼ yd. Osgood Electric Shovel.
3—Rotary Dryers 4x30′, 4x40′, 5x30′.
3—Tyler Hummer Screens, 4x5′ and 3x5′.
4—3x6′ Sturtevant Moto-Vibro Screens, 2-deck.
1—4′x7′ Leahy Vib. Screen, double deck.
1—150 Amp. Lincoln Electric Welder, port.
1—#5 I-R. Drill Sharpener.
7 Bucket Elevators, various sizes, encl.

CONSOLIDATED PRODUCTS COMPANY, INC.

17-19 PARK ROW NEW YORK, N. Y.

OUR SHOPS AT NEWARK, N. J., COVER EIGHT ACRES

PRICED FOR QUICK SALE

1—48″ Symons Horizontal Disc Crusher (Nordberg Mfg. Co.), completely overhauled, rated capacity 1″ product, 45-60 T.P.H. $1,000.00

1—8″ Allis-Chalmers Style N Gyratory Crusher, No. 7715, like new; used only one season. Manganese fitted, non-choking concaves, smooth head for fine crushing, extra head for coarse crushing $850.00

1—No. 2 Allis-Chalmers Gyratory Crusher, manganese fitted $250.00

1—Allis-Chalmers Eccentric with manganese steel gear for No. 5 style K crusher, like new.. $150.00

1—30″x16″ Wis. Foundry Crushing Rolls... $450.00

1—24″x14″ Wis. Foundry Crushing Rolls... $275.00

Several Vibrating Screens, Bucket Elevators, Sand Classifiers, Electric and Gasoline Motors, 2″, 3″, 4″, 6″ Self-priming centrifugal pumps with gasoline motors; 1½″, 2″, 3″, 4″, 6″ centrifugal pumps with electric motors.

1—Portable Air Compressor, on pneumatic tired wheels, 160 c.f.m. actual air.

1—Portable Air Compressor, on pneumatic tired wheels, 105 c.f.m. actual air.

Above compressors are like new, have been used only a few months.

1—Link-Belt Shovel Boom Assembly with 1 yard Amsco dipper, excellent condition, will fit models K1, K2, K35, K42.

1—Northwest ¾ yard Shovel Boom Assembly for Model 104-105.

1—P&H ¾ yard Shovel Boom Assembly for Model 206.

LIPPMANN ENGINEERING WORKS
4603 W. Mitchell Street Milwaukee, Wis.

FOR SALE

14—Kilbourne & Jacobs 16 cu. Yard air operated Dump Cars, fully rebuilt and available for immediate inspection and delivery, quotations and prints gladly furnished.

RAILWAY ACCESSORIES COMPANY, 3408 Carew Tower, Cincinnati, Ohio

FOR SALE OR RENT

LORAIN 75-A 1¼ yd. Shovel No. 3929.

LINK-BELT K44, 1½ yd., Crane, Drag, and Backhoe, No. 1639.

Northwest Mod. 18 ½ yd. Shovel No. 4408. Like new.

Bucyrus-Erie GA-2 1¼ yd. Shovel No. 4046. $1750.00.

Lima No. 101 15 ton Crane. Excellent Condition.

P&H Model 400 ¾ yd. Shovel No. 3953. Rebuilt.

3—Link-Belt K-55 Draglines 70′ Boom.

SPECIALS

2—Chicago-Pneumatic 15x9x10 Compressors direct con. Benz 40D 120 HP Diesel Eng. 664′ ea. Like New, comp. with all accessories and ready to work.

Ingersoll-Rand, Mod. 420 Portable. Actual Cap. 413′ at 100 lb. Used less than SIX MONTHS. New Guarantee. Bargain.

Plymouth HLB, 25 Ton, Std. Ga., Gas Loco., No. 3212.

Whitcomb 4 ton Gas Loco., 24″ Ga. Like New. $395.00.

2—Whitcomb 6 ton Gas. Loco. 24″ Ga. Good. $350.00 ea.

2—Owen ¼ Type M Clamshell. Almost new.

1—Hayward 1 yd. Rehandling Clamshell.

30—C.P. No. 5 DRIFTERS comp. with shells and screws. $65.00 each.

CHARLES DREIFUS COMPANY
Widener Building Philadelphia, Pa.

LOCOMOTIVES
SHOVELS—CRANES
ATTRACTIVE PRICES

1—80 Ton American 0-6-0 Switcher

1—75 Ton Baldwin 0-6-0 Switcher

2—40 Ton American Saddle Tanks

1—38 Ton Vulcan Saddle Tank

1—38 Ton Porter Saddle Tank

2—25 Ton Plymouth Gasoline
STANDARD GAUGE—RECONDITIONED

1—Marion 480 Combination Steam Shovel & Crane

1—52-B Bucyrus Dragline Atlas Imperial Diesel Engine—70 ft. Boom

1—25 Ton Browning 8-C Steam Locomotive Crane

Birmingham Rail & Locomotive Co.
BIRMINGHAM, ALA.

Concrete batching plant, 5 compts., 1000 yds. aggregates, 750 yds. cement, automatic weigh batcher.
Robinson bulk cement unloader, air.
225 bbl. Erie bulk cement plant, complete.
155 bbl. Fuller cement bin, electric batcher.
Blaw-Knox 270 bbls. bulk cement plant, complete.
72 ton Blaw-Knox steel bin, portable, 2 compts.
50 ton Blaw-Knox steel bin, portable, 2 compts.
42 cu. yds. Beaumont steel bin, 2 compts.
Fuller Kinyon bulk cement unloader, portable.
Fuller C40 rotary air compressor, electric.
Gyratory crushers: K.V.S. 30, 37-S, 49; Telsmith 32, 8A, 8B; Traylor 8″; McCully 13″, 8″, 6″.
Jaw: 6x12, 9x16, 10x20, 12x26, 13x30, 18x36, 24x36.
Jeffrey type A 30″x24″ pulverizer.
Apron feeders, 18″x6′, 24″x6′, 48″x14′, 5′x15′.
Bucket elevator, 65′, chain, buckets 24″x12″x17⅝″.
Revolving screens, 72″x20′, 72″x18′, 60″x24′.
Robins 4x8 double deck Gyrex vib. screen.
Telsmith 4′x10′ single deck vibrating screen.
Whirley, 25 tons cap., 85′ boom, electric.
43-B Bucyrus-Erie Diesel 2 yd. shovel.
41-B Bucyrus-Erie comb. crane and shovel. Steam.
50-B Bucyrus-Erie steam shovel.
Browning 10 ton crane, gas, 40′ boom.
Blaw Knox single line clamshell bucket, ¾ yd.
Haiss clamshell bucket, 1½ yd. rehandling.
Barber-Greene conveyor, 24″x70′.
8 Barber-Greene conveyors, 24″x35′, type N.
Barber-Greene conveyor, 18″x60′.
4 I.R. Wagon drills, FM-2, pneumatic tires.
I.R. quarry bar, complete with I.R. X71 drill.
I.R. Model 50 Leyner drill sharpener.
Plymouth 24 ton std. gauge gas locomotive.
Plymouth 20 ton std. gauge gas locomotive.
Vulcan 6 ton 36″ gauge gas locomotive.
Vulcan 4 ton 36″ gauge gas locomotive.
Dredge pumps, 6″, 8″, 10″, 12″, 16″.
8″x8″ cent. Lawrence pump, portable, 35 HP, gas.
8″x6″ cent. Barnes pump, portable, 35 HP, gas.
6″x5″ Lawrence pump, 20 HP, electric.
4″x4″ cent. LaBour self priming pump, 15 HP, elec.
I.R. Type 20, 310 cu. ft. air compressor. Portable.
DeWalt woodworker, 16″ circular saw, electric.
Stiff leg derrick, steel, 30 tons, 97′ boom.
Steam hoist, 10″x12″, 3 drums, Lidgerwood.
Stiff leg derrick, steel, American, 15 tons, 90′ bm., with 3 drum American 125 HP electric hoist & swinger.
Clyde 3 drum electric hoist & swinger, 75 HP.
Lidgerwood, 2 drums, swinger, gas hoist, 75 HP.
Sauerman two drum dragline Hoist, 75 HP, gas.
RICHARD P. WALSH, 30 Church St., New York, N. Y.

FOR SALE—A Good Time to Buy

Crushers-Gyr. 21K-8K-7½K-6K-4K.
Turbo Generators (2) 750 KW ac-1 dc.
Crushers Jaw 66x86-60x84 Gear Reducer 1000 HP.
Rotary Kilns (2) 8'x125'-8'x150'—with coolers.
Storage bins steel 3 comp. 150 yd.—Concrete P/P.
Loco. Cranes 40 ton—30 ton—25 ton—20 ton RR.
Mine hoists 2-slope & vertical 400 HP motors.
Dump cars 12 yd.—20 yd.—30 yd. steel air dump.
Bucket loaders (2), Haiss (1) Barber—2 Gas rollers.
Draglines 2 Page 220—2 Monighan 4 W.
A. V. KONSBERG, 11 W. Jackson Blvd., Chicago

Rebuilt Guaranteed ELECTRICAL EQUIPMENT

AC — Motors — DC
Air Compressors — Diesel Engines
Gasoline & Electric Locomotives
Generators — Transformers
Write for Stock List
DUQUESNE ELECTRIC & MFG. CO.
Pittsburgh, Pa.

FOR SALE

8 Miles of 25 lb. Used 24 Gauge Steel Track with Steel Ties, 15 ft. Lengths.
Four 8 Ton Plymouth Gas Locomotives.
100 Batch Cars.

Jos. Greenspon's Son Pipe Corp.
National Stock Yards (St. Clair Co.), Ill.

DIESEL ENGINE GENERATOR PLANT

3—Duplicate 219 KVA G.E. Alternators 2400/480/240 v. 3 ph. 60 cy. 200 RPM each direct connected to 300 HP Buckeye Diesel Oil Engines. Complete. 10 years old. Perfect condition.

MOORHEAD-REITMEYER CO. INC.
30th & Brereton Sts. Pittsburgh, Pa.
May. 7900

Jaw, Roll and Cone Crushers, various sizes.
8A, 8B, 10B, 32B & 40B Telsmith. 19, 25S Kennedy.
No. 3, 4, 6 TZ Traylor Gyratory Crushers.
Swintex Cutters 50', 10"-45', 15" pipe.
6, 8, 10 & 12" Sand & Gravel Pumps, other centrifugals.
Conveyor Equipment 14"-36", belt and Portable.
Barber-Greene Loaders, Models 42, 42A, 57.
Vibrating and Rotary Screens, all types and sizes.
4—Euclid 6-7 Crawler Dump Wagons.
Gasoline Locos—all weights and gauges. Dump Cars.
1½ yd. Page—"C" Dragline Bucket.
90 HP Fairbanks, 110 HP Anderson Diesels.
Ask for Bulletin No. 49
MID-CONTINENT EQUIPMENT CO.
710 Eastgate Pa. 2290 St. Louis, Mo.

FOR SALE
Special Diesel Oil Engine Prices—

15 hp. FBM Oil Engine	$ 175.00
25 hp. FBM Oil Engine	300.00
40 hp. Full Diesel, four cycle Oil Eng.	400.00
80 hp. Full Diesel, four cycle Oil Eng.	700.00
120 hp. Full Diesel, four cycle Oil Eng.	900.00
110 hp. Anderson Oil Eng., good, 2 cyl.	1150.00
80 hp. Venn Severn, 2 cyl., good	900.00

Various makes and sizes. At prices you can afford to pay.
J. D. ANDERSON MACHY. CO.
5516 Maple Ave. St. Louis, Mo.

100000 ITEMS

- Motors
- Generators
- Transformers
- M G Sets

Wire—Write—Phone
ERIE ELECTRIC MOTOR REPAIR CO., INC.
124 Church St. Buffalo, N.Y.

FOR SALE OR LEASE

1,500 acres: Virginia Gold Property. Large tonnage, low grade ore at surface. Equipped with Diesel Driven Flotation Mill.

AMOS V. PANKEY
Harrisonburg, Virginia

FOR SALE

301 Koehring Dragline.
6" Pump Connected to 100 HP gas engine.
B-G Loader.
Shovel Attachment P&H 600.
1¼ yd. Osgood Shovel.

F. W. HERKEL
3021 Kenilworth Ave. Berwyn, Ill.

COMPRESSOR SULLIVAN ANGLE COMPOUND 13—8x8, CAPACITY 406 C.F.M., MOUNTED ON STRUCTURAL STEEL BASE AND SKIDS, WITH A.C. WAGNER 220 VOLT 3 PHASE 60 CYCLE MOTOR. AVAILABLE ALSO WITH DIESEL POWER. EXCELLENT CONDITION. A REAL BUY.

WRITE FOR OUR COMPLETE LIST
O. B. AVERY COMPANY
1325 MACKLIND AVE. ST. LOUIS, MO.

ELECTRICAL MACHINERY

Motors and Generators, A.C. and D.C. for sale at attractive prices. New and Rebuilt. All fully guaranteed. Write for List and Prices.

V. M. NUSSBAUM & CO.
FORT WAYNE, IND.

FOR SALE
NEW MANGANESE FITTED

7" Newhouse Crusher 60 cycle—3 ph—220 V—direct connected motor.

WISCONSIN SAND & GRAVEL CO.
623 N. 2nd St. Milwaukee, Wis.

SELECTED BARGAINS

25 ton Plymouth Gasoline Locomotive. Rebuilt.
25 ton Industrial Locomotive Crane. Modern.
1 yd. & 1¼ yd. P and H Cranes & Draglines.
240 HP Fairbanks Morse 200 KVA Diesel Gen. Set.
180 HP Fairbanks Morse Dredge type Diesel.
120 HP Atlas 6 cyl. Diesel Power Unit. Clutch.
20"x200' Sullivan Troughed Belt Conveyor.
Send for Catalog 120

MISSISSIPPI VALLEY EQUIPMENT CO.
501 Locust St. St. Louis, Mo.

LIPPMANN 42"x24" roll crusher, 1937, Timken.
PIONEER 300 W portable sand & gravel crshg., screen'g & wash'g plant; pump, pipe, motors, 100 yds. hr.
CEDAR RAPIDS portable black top road-mix plant.
PLYMOUTH 30, 25 & 16-ton std. ga. gas locomotives.
DIESEL Engs. & gen. sets, 420, 360, & 180 HP.
MILWAUKEE 7-ton 30" ga. gas locomotives.
CLYDE elec. Whirley crane, 5-ton, 75' bm. (West.)
Portable duplex rock crushing plant.
H. Y. SMITH CO., 828 N. Broadway, Milwaukee, Wis.

FOR SALE

Electric Scraper Hoist, Factory Rebuilt. Like New. 200 HP. Full Details Upon Request.

LIDGERWOOD MANUFACTURING COMPANY
P. O. Box 18 Elizabeth, New Jersey

UNUSUAL ITEMS . . . . . UNUSUALLY PRICED!

1—6½-yd. Bucyrus 320-B Electric Shovel.
16—20-yd. Magor air operated Dump Cars.
12—50-ton Covered Hopper Cars.

IRON & STEEL PRODUCTS, INC.
13490 S. Brainard Ave. Chicago, Ill.

NEW WIRE ROPE FOR SALE

⅝", ¾", ⅞", 1", 1⅛", 1½", 1¾", 2", 2¼"

This cable is BRAND NEW IN EVERY RESPECT. SUITABLE FOR HOISTING, GUY LINES, SHOVELS, etc.
VERY ATTRACTIVE PRICES.

TERRENCE P. WYNN
55 West 42nd St. New York, N. Y.

P&H 750 Diesel shovel &/or drag. Also P&H 900. Loco. Cranes—Ohio 25 & 30 ton. Browning 15 & 35 ton.
Bargains—P&H 400 crane. P&H ¾ yd. Shovels.
Cranes—Drags—Universal & Speeder B-3 & B-4.
Loaders—Barber-Greene 42, Haiss Model 27.
Conveyors—24"x80' & 60'. 24"x60' Gas portable.
Coal Conveyor—Barber-Greene 30' gas crawler type.
Screw Washer—24"x20'. Bucket elevator 16"x30'.
Screens—2 deck 5x10 Simplicity, 4x8 L-B, 3x8 Jigger.
Jaw crusher—9x36. Rolls—14x24, 18x24, & 16x36.
JAMES WOOD, 53 West Jackson Blvd., Chicago, Ill.

LOCOMOTIVE FOR SALE

Steel, steeple type for slow speed freight service offered complete with all power equipment necessary for operation . . . Includes Air Compressors, heaters, switchboard, 300 KW Syn. M.G. Set rated at 900 R.P.M., etc. . . . Write for complete specifications and price.

Chicago Electric Co. 1334 W. Cermak, Chicago

FOR SALE

3T Bucyrus Monighan Drag Line, 70 to 90 ft. boom. Will handle 4 yard bucket. Completely rebuilt, electrically operated, and ready to go. Priced to sell. For full specifications and price, address

BRODERICK & GORDON
3901 Medford St., Los Angeles, Calif. 5230 Washington St., Denver, Colorado

Royal E. Burnham
Attorney at Law
•
Patent and Trade-Mark Causes
•
511 Eleventh Street, N. W.
WASHINGTON, D. C.

O. C. HOFFMAN, Pres. L. H. HOFFMAN, Treas.
DIAMOND CORE DRILLING
HOFFMAN BROS. DRILLING COMPANY
PUNXSUTAWNEY, PA.

We drill for any mineral. We have more than forty steam, electric and gasoline drills, adapted for any job. Satisfactory cores guaranteed. Our prices are right.
Established 1902 - - - - - Telephone No. 382

WE LOOK INTO THE EARTH

By using Diamond Core Drills We drill for Limestone, Gypsum, Talc, Fire Clay, Coal, and all other minerals.

PENNSYLVANIA DRILLING CO.
Drilling Contractors
Pittsburgh, Pa.

DEPENDABLE MACHINES for rent or sale

Northwest No. 3 comb. shovel and dragline.
Bucyrus 1 yd. steam crane, cheap.
Byers Bearcat crane, cheap.
Page 1 yd. RC dragline bucket.
New Caterpillar D-8800 engine.
Northern conveyor 30 ft. by 18 in.

TRACTOR & EQUIPMENT CO.
433 S. Jefferson St., Chicago
Branch: Box 392, Springfield, Ill.

RAILS "1 Ton or 1000"

NEW RAILS—5000 tons—All Sections—All Sizes.
RELAYING RAILS—25,000 tons—All Sections—All Sizes, practically as good as New.
ACCESSORIES—Every Track Accessory carried in stock—Angle and Splice Bars, Bolts, Nuts, Frogs, Switches, Tie Plates.
Buy from One Source—Save Time and Money. 'Phone, Write or Wire.

L. B. FOSTER COMPANY, Inc.
PITTSBURGH NEW YORK CHICAGO

FOR SALE

1—Heavy Duty ¾ yd. Bay City Shovel manganese dipper front, 40 ft. heavy duty crane boom.
1—Hercules Motor DRXB.

CLIFFORD WATERHOUSE
Jackson Mississippi

HYDRATE PLANT EQUIPMENT

1—Clyde 6-8 ton Continuous
1—Kuntz 6 ton Continuous
1—Schultless 1 ton Continuous
1—Schultless 2 ton Continuous
All With Kuntz Dust Control
1—6-8 ton Kuntz hydrate system for double Separation. This plant was recently replaced by a 10-12 ton per hour Kuntz system for triple separation.

BOX 574, York, Pa.

WANTED

Tunnel Shovel (Electric)
¾ to 1½ yard dipper.
Send replies to
Box 616

PIT AND QUARRY PUBLICATIONS
538 S. Clark St. Chicago, Ill.

POSITION WANTED—Within next six months. Experienced plant manager with thorough knowledge of open and underground quarries, lime burning, shaft kilns, hydration, cost and maintenance. Successful record of handling labor. State salary.
Address

BOX 528
PIT AND QUARRY PUBLICATIONS
538 S. Clark St. Chicago, Ill.

WE BUY, REBUILD, SELL OR RENT

AIR COMPRESSORS
Portable and stationary, belt with elec. or gas power, sizes from 20 cu. ft. to 1,000 cu. ft.

BINS
9—1—118 ton Blaw Knox; 2—85 ton Heltzel; 1—60 yard Butler V-60; 1—72 Blaw-Knox; 1—60 ton Butler V-40; 2—35 ton Blaw Knox; 1—26 ton Heltzel with Kron-dial scale. All above with or without volume or weigh batchers.
1—Bulk Cement Handling Plant with Johnson 300 bbl. bin. Jeffrey elevators, portable.

BUCKETS
26—Clamshell, all sizes and types; Williams, Blaw Knox, and Owen.
6—Dragline: 1—1¾ yd. Northwest; 1—1½-yd. Omaha; 1—1¼ yd. Page; 2—1 yd. Hayward; 1—¾ yd. Page.
1—1½ yd. Pioneer Cableway Excavator bucket.
7—Dragscraper: 2—1 yd. Sauerman; 1—1 yd. Green; 1—¾ yd. Garst; 2—½ yd. Garst.

CONVEYORS & ELEVATORS
4—Steel frame belt conveyors: 3—18" Barber-Greene 60', 45' & 24'; 1—National 18"x30'.
11—Bucket elevators: Rex and Weller, on chain or belt; all sizes.

CRANES, DRAGLINES & SHOVELS
1—Link Belt Mod. K-55 combination dragline and shovel Ser. No. 1698, gasoline power, 70 dragline boom, 2 yd. shovel frame.
1—Page, Model No. 411 Diesel crawler dragline, 70' boom, 2 yd. bucket.
1—P & H Model No. 650, Serial No. 4188, 65' boom; 1¼ yd. bucket.
1—Link-Belt K-42, combination shovel, crane and trench hoe. Serial No. 1265, 1¼ yd. shovel front, 60' crane boom.
3—Northwest. Model No. 105, Serial Nos. 2053, 1645 and 1522, 40' boom, 1 yd. bucket.
1—Link-Belt, K-1. Serial No. 1024, 50' boom, 1 yd. bucket.
2—Osgood Heavy Duty, Serial No. 2089 and No. 2087, combination 1 yd. shovel and crane, 40' boom.
2—Thew, Model "O" combination shovel crane and dragline, Serial No. 2801 and No. 2687, ¾ yd. shovel fronts, 40' crane boom.
1—P & H Model No. 206, 40' boom, ¾ yd. bucket.
1—Byers Bearcat, Serial No. 3299, 30' boom, ½ yd. bucket.

CRUSHERS
6—Jaw Crushers: 1—12 x 26" Champion; 1—12x20" Acme; 2—10x20" Climax No. 2½; 1—9x16" Telsmith No. 9A; 1—9x15 Champion.
3—Gyratory: No. 5 Gates; 1 No. 3 McCully; 1—No. 0 McCully.
1—Set of Allis-Chalmers, smooth type crushing rolls, 42x16".

DREDGE PUMPS
1—12" Morris Heavy Duty D. C. to 100 H.P. dbl. cyl. steam engine.
3—Belt Driven: 3—Morris Mang., 1—10", 1—8", 1—6".

HOISTS
1—2 yd. Thomas 2 speed Class L Cableway excavator hoist with 150 HP electric motor.
1—1 yd. Cedar Rapids 2 speed dragscraper hoist with 50 HP electric or gas power.

TRACTORS AND SCRAPERS
14—2—Caterpillar D-8, Diesels with 13 yd. LeTourneau scrapers; 1—Allis-Chalmers mod. L, 12 ton crawler tractors with or without Baker bulldozer; 3—Allis-Chalmers mod. 75, 12 ton crawler tractors; 3—Caterpillar tractors: 1—mod. 65; 1—mod. 60, 10 ton; 2—mod. 30; 5 ton, 1 with derrick attachment; 1—Allis-Chalmers, model K, 5 ton tractor with Baker hydraulic bulldozer; 2—Linn; 2—Fordson, one with winch and one with derrick attachment.

WHIRLEY
1—Mod. 75 Wiley Whirley No. 2973, 20 tons cap., 75' boom, 3 D Clyde 80 HP elec. hoist and 30 HP elec. swinger, all complete. Perfect condition.

PLEASE SEND FOR COMPLETE STOCK LIST

EQUIPMENT CORPORATION OF AMERICA

PHILADELPHIA—1505 Race St. Phone: Rittenhouse 4664

CHICAGO—1160 So. Washtenaw Ave. Phone Nevada 2400

PITTSBURGH—P. O. Box 933. Phone Federal 2000

Rebuilt Equipment

BROWNING Model 8-DT, 20 Ton 8-Wheel Locomotive Crane.
2—PLYMOUTH 30-ton 6-wheel Std. Ga. Diesel Locomotives.
4 PLYMOUTH 4 ton 24" Ga. Gas Locomotives.
BROWNHOIST 15 ton Locomotive Crane; 50' Boom.
VULCAN 8 ton Std. Ga. gas locomotive.
BALDWIN 58 ton 6 wheel switcher, 19x24" cyl. Walscheart valve gear.
DAVENPORT 22 ton 4-wheel Saddle Tank; Cyl. 11x16.
SPEEDER ½ Yd. Dragline, 30 ft. Boom; Cat. Gas Motor.
P&H Model 330, ¾ Yd. Dragline.
PLYMOUTH 12 Ton 36" Ga. Gasoline Locomotive; Hand Brakes.
WILLIAMS 1 Yd. Clamshell Bucket.
14—2 Yd. Koppel 36" Ga. V-Shaped Dump Cars.

Write for Complete List

SOUTHERN IRON & EQUIPMENT COMPANY

Plant & General Offices
Atlanta, Georgia

REBUILT EQUIPMENT F O B ASHEVILLE, N. C.

1—**Chicago Pneumatic** 105' **Air Compressor** Model PG2 ..... **$1150.00**
1—10B **Erie** ¾ yard **Shovel and Crane** **$3450.00**
1—**Champion** 20x50 **Jaw Crusher**, **$3000.00**
1—**Barber-Greene** Model 42-B **Bucket Loader** **$1100.00**
1—**Lidgerwood** 8x10 Double Drum **Steam Hoist** with boiler **$1100.00**
2—**Page** ¾ yard Type C **Dragline Buckets**, each **$300.00**
1—**Blaw-Knox** ¾ yard **Clamshell Bucket** **$300.00**
1—**Erie** ¾ yard **Clamshell Bucket** **$300.00**
1—**Marion** Model 32 **Steam Dragline** 50' boom **$2500.00**
1—**Browning** 15 ton **Locomotive Crane** 50' boom **$1900.00**
1—**Universal Bucket Elevator**, 32' center, buckets 8"x6"x12" **$300.00**
1—**Lorain** 75-B **Steam Shovel**, fair condition **$2500.00**
1—**P&H** ¾ yard **Shovel** powered with Caterpillar D-8800 Diesel Engine, completely rebuilt, 2 years old **$5500.00**

AL J. GOODMAN
P. O. Box 263 Asheville, N. C.
Phone 3519

1—REX 2½-3 yard capacity truck mixer.
3—Ingersoll Rand Size "D" Wagon Drills complete.
1—Midwest 10 ton, 36" gauge locomotive with self starter.
1—Ingersoll Rand Size 8 AFV pump with 60 HP., A.C. 3 phase motor.
1—Ingersoll Rand Size 8 AFV pump with 75 HP., A.C. 3 phase motor.
1—Barber Greene model "N" conveyor gas engine or electric motor.
2—Four ton, 36" gauge locomotives.
1—Ingersoll Rand type 34 Drill Sharpener.
1—Sullivan size DR-82 Drill Sharpener.
7—Chicago Pneumatic model 52 Wet Type Sinker Drills.
1—Ingersoll Rand Size 14 AFV pump with 300 HP., A.C. 3 phase motor.
1—Marion Diesel Electric 1½ cu. yd. shovel.

Also V shape cars, all sizes, pneumatic tools, generators, drill steel, etc.

E. B. KELLEY CO., INC.
4387 Vernon Blvd., Long Is'and City, N. Y.

SHOVELS—CRANES

1—Lorain-77 Diesel Shovel No. 5287, double drums, 1½-yd., overhauled.
1—Marion-21 Electric Crawler Shovel ¾-yd.
1—Lorain-40 Truck-Shovel attachment ¾-yd.
1—Northwest No. 4 Backhoe 47" bucket, overhauled.
1—Byers "Bulldog" Backhoe 25" and 37" buckets.
1—Universal Truck - Crane No. 1146, 4 - sp. Mack, pneumatic tires, bargain.
1—Lorain-40 — 8½ - ton Truck - Crane 4 - sp. Mack.
1—15-ton cap. Northwest No. 4 Gas Crawler Crane, No. 3793, 40-60' boom, overhauled, in excellent condition.
1—Lorain 75-B Gas Crawler Crane 45' boom.
1—New style Northwest Dragline Fairlead.
2—Linn Tractors—one 7-yd. all steel body—one std. 6½-yd. rebuilt with new crawlers, rollers, etc.

GREY STEEL PRODUCTS CO., INC.
74 Central Ave. Glen Rock, N. J.
Tel. Ridgewood 6-2275

EQUIPMENT FOR SALE CHEAP

1—Vulcan 40 ton Std. Ga. Saddle tank locomotive.
1—Marion 1 yd. Steam crane 40' boom on cats.
1—Russell Grader, 10' Blade.
1—Link-Belt K-30, Trench Hoe Att. 45' Crane Boom.
1—Link-Belt K-44 shovel 50' boom, fairleads.
1—Lorain 75 B 1¼ yd. chain crowd shovel.
2—Whitcomb 12 Ton 36" Gauge Locomotives.
2—C. P. Compressors, 590 cu. ft., 100 h.p. motor.
2—Worthington Compressors, 621 cu. ft., 75 h.p. mtr.
1—Allis-Chalmers 75 Caterpillar Tractor with Bulldozer.
2—Chicago Pneumatic Compressors, 750 cu. ft., 50 lbs., 100 H.P. motors.
1—Ingersoll-Rand pavement breaker.
6—Easton 4 yd. all steel 36" Ga. cars.
4000' of 9" x 9" road forms.
1—Ransome 27 E Paver.
2—No. 116 Chicago Pneumatic Paving Breakers.
2—1 yd. Insley bottom dump concrete buckets.
1—Schramm No. 120 Compressor.
1—1 yd. Owen Bucket.
1—1 yd. Kiesler rehandling bucket.
1—¾ yd. Browning clamshell bucket.
1—¾ yd. Blaw-Knox bucket.
1—Le Courtney 6" Cent. Pump, 40 h.p. motors.
1—Morris 8" dredge pump, 150 h.p. G.E. motor.
1—Morris 10" cent. pump, 2250 GPM at 130' head.
1—Goulds 12" cent. pump, 50 h.p. G.E. motor.
1—Thompson 6" self-priming pump, Waukesha motor.
2—Gardner Denver Sheeting Hammers.
2—Humdinger 6" self-priming pumps, gas motor.
1—Humdinger 4" self-priming pump.
1—Humdinger 2" self-priming pump.
1—Domestic double diaphragm pump, gas motor.
1—G.E. motor, 200 h.p. slipring.
2—No. 9 B 2 McKiernan-Terry Hammers.
3—No. 5 McKiernan-Terry Hammers.
3—No. 7 McKiernan-Terry Hammers.

HARRY C. LEWIS
325 Frelinghuysen Avenue Newark, N. J.

SCREENS: 4x8 2-deck Gyrex Vibrating.
4x8 2-deck Perfex Heavy duty Shaker.
4x5 1-deck Hummer Vibrating, V-16.
4x8 1-deck Hummer Vib., 2-unit V-40.
120 New 3x5 and 4x5 Hummer Screen Frames.
3x8 1-deck Link-Belt Vib., Belted.
3x5 1-deck Multirap Vib., Belted.
30" Telsmith Enclosed Rotary Grizzly.
CONVEYORS: 12"-36" Belt-Idlers-Pulleys.
12"x50' 12"x80', 24"x100', 24"x200',
30"x100', 30"x125', and Portable Types.
CRUSHERS: 9x15, 9x16, 10x20, 12x18
24x36-B Jaw and 28x30 Robins Rolls.
ELEVATORS: 24"x40', 20"x50', 14"x50',
13"x40' Continuous Bucket Inclined.
10"x40' Chain. 6"x50' Enclosed Belt
Casings, Drives, Pulleys, Buckets, etc.
RAIL EQUIPMENT: 16—24"-g. 1-yd. Cars.
2—30"-g. Mercury Battery Locomotives.
24" to 36"-g. Portable Cars and Track.
COMPRESSORS: 45' and 173' Belted.
12x12x12 Steam-Air Compressor, 1-R.
MISCELLANEOUS: ¾-yd. Erie Shovel Front.
50 and 60-hp. Waukesha Gasoline Engines.
2—Drum Stroudsburg Builders Gas Hoist.
12 Centrif. Elec. and Belted Water Pumps.
¾, 1, 1¼ and 2½-yds. Clamshell Buckets.
12—KVA Generator Set, for Hummer Screens.

G. A. UNVERZAGT
15 PARK ROW NEW YORK CITY

NEW DIESEL PLANT FOR QUICK SALE

2—200 KW. 3/60/220/480 v. direct con. to
2—300 HP. 10½x15, solid injection 400 RPM.
Complete with all auxiliaries.

STEPHEN A. DOUGLASS CO.
660 Fort Washington Ave., New York, N. Y.

RELAYING RAILS

All sections new and relaying rail, spikes, bolts, frogs, switches, "V" Shaped, flat and Contractors' Cars, etc. Prices cheerfully quoted.

M. K. FRANK
480 Lexington Ave., NEW YORK CITY
25 St. Nicholas Bldg., PITTSBURGH, PENNA.

NEW CONVEYOR BELTING FOR SALE

42" 5 ply 3/32" x 1/16" covers, 130 ft.
36" 5 ply 3/16" x 1/16" covers, 175 ft.
30" 5 ply 1/8" x 1/16" covers, 47 ft.
12" 8 ply 3/32" x 3/32" covers, 105 ft.

BUCKET ELEVATOR BELT
One length of 12" BUCKET ELEVATOR BELT, with 10" buckets attached. Belt is 1/16" x 1/16" rubber covered. 71 ft.

TERRENCE P. WYNN
55 West 42nd St. New York, N. Y.

TRUCK MIXER FLEET READY TO GO

6—1½-2 yd. Jaeger Truck Mixers on EH Mack trucks. Good as new, only used two years. Mixers latest type Jaeger's. Trucks 1938 Late Model Macks.

2—1½-2 yd. Jaeger Truck Mixers on De-Luxe model Fords—very good condition—ready to go—excellent buy.

3—4 yd. Rex Moto-Mixers on 1938 Autocar Trucks. Mixers new 1938—now working.

4—4 yd. Rex Moto-Mixers on AC Mack Trucks. Mixers new 1937—now working.

1—2½-3 yd. Rex separate engine drive mixer, 1931, mounted on GMC dual pneumatic tired truck.

1—3-3½ yd. Rex separate engine drive mixer, 1930, mounted on AC Mack.

1—2-2½ yd. Blaw Knox Truck Mixer—separate engine drive—used one year—without truck.

1—80 ton 2 compartment Bin.

Pumps—from 2" to 10" Jaeger's—Self-Priming Centrifugal.

Mixers—7S-10S-14S Low Charge and Power Loaders—late models.

Trenching Machine—Compressors—Vibrators.

Spencer Dust Collectors—Hoists—Engines—Parts.

½ yard Speeder Crane—¾ yard Northwest Crane.

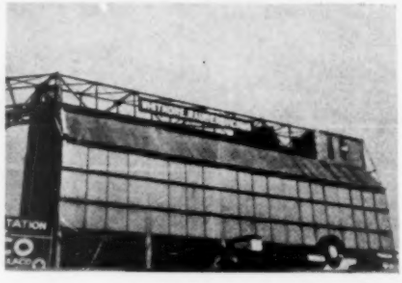
Orange Peel Bucket.

THE JAEGER-LEMBO MACHINE CORP.

127-04 Northern Blvd. CORONA, L. I., N. Y.

Phone: NEwtown 9-7777

OPPORTUNITY TO ACQUIRE very fine set of late model storage bins suitable for any type of aggregate materials. Unit is still erected at its original location in the yards of Whitemore, Rauber, and Vicinus, at Rochester, New York, where inspection can be made.



BUTLER-TYPE SPECIAL U2—1500 ton—5 compartment—each compartment 16'x16'—bottom discharge—roller gate shutoffs—truck room under bin for loading. All in excellent condition—Unit PRACTICALLY NEW—Will pass most rigid inspection.

In order to move these bins we are open to a reasonable offer for the immediate disposition of this outfit.

BROOKLYN CONTRACTORS MACHINERY EXCHANGE, Inc.

1415 Bergen Street President 3-7777 Brooklyn, New York

FOR SALE

Inspection Invited

1—8' Hardinge Ball Mill.
1—6'x8' Traylor Ball Mill.
Liners of both practically new.
1—No. 4 Kennedy Gyratory Crusher.
1—Set American Crushing Rolls, in circuit with Kennedy Crusher.

AMOS V. PANKEY
Harrisonburg, Virginia

LIQUIDATION

1—Raymond 3 roll High Side Roller Mill.
1—Jeffrey 24" x 20" Type "B" Hammer Mill.
1—Jeffrey 30" x 24" Type "A" Hammer Mill.
1—Patterson 6' x 8' Continuous Feed Ball Mill, with air separator.
2—Vulcan 8' x 150', 2 Tire Kilns.

Your Inquiries Solicited

BRILL EQUIPMENT CORP.
183 Varick St.
N. Y. C.

FOR SALE
USED EQUIPMENT

10x20 DIAMOND Roller Bearing Jaw Crusher.
10x36 DIAMOND Roller Bearing Jaw Crusher.
15x36 DIAMOND Roller Bearing Jaw Crusher.
2'0"x4'0" single deck DIAMOND vibrating screen.
6 to 8 HP model MRP3 LeRoi Engine.
Model No. U-40 Allis-Chalmers Engine.
4" Sterling Sand pump No. 3558.
60"x20'x0" Revolving screen — Structural frame on wheels.

NEW EQUIPMENT

1—DIAMOND 9x16 Bronze Bearing Jaw Crusher mounted on truck with 15-20 HP engine.
3'0"x8'0" Triple deck Diamond Vibrating Screen.
21-Cu. yard jack leg bin.
Special Price for quick sale.

DIAMOND IRON WORKS, INC., AND THE MAHR MANUFACTURING COMPANY DIVISION
Minneapolis Minnesota

WANTED TO BUY

LATE TYPE CONTRACTOR EQUIPMENT OF ALL KINDS.
ESPECIALLY INTERESTED IN PURCHASING LATE TYPE EUCLID-TRAC TRUCKS.

BROOKLYN CONTRACTORS MACHINERY EXCHANGE INC.
1415 Bergen St., Brooklyn, N. Y.

Advertise Your

"Wants" and

Surplus Equipment

RECONDITIONED EQUIPMENT

One 80 H.P. Lambert electric three drum hoist, $1200.00
Three 80 H.P. Lidgerwood electric two drum hoists with attached swingers, $900.00 each
Two 72 H.P. Thomas gasoline two drum hoists, $1000.00 each
One 60 H.P. Thomas electric three drum hoist, $975.00
Three Lambert 60 H.P. electric two drum hoists with attached swingers, $800.00 each
One 40 H. P. Thomas gasoline two drum hoist with attached swinger, $650.00
Two Thomas 35 H.P. electric two drum hoists with attached swingers, $600.00 each
One Clyde 25 H.P. electric two speed drag scraper hoist, $500.00
One Sullivan 315′ two stage gasoline portable air compressor, $1800.00
Three Sullivan 310′ gasoline portable air compressors, $650.00 each
Two Sullivan 220′ gasoline portable air compressors, $600.00 each
Two 20 ton American Terry No. 3 guy derricks, with 90′ boom, 80′ mast, $1500 each
One 24″ Portable belt conveyor, 40′ long $600.00

Crane Type Motors
3 and 2 phase, 60 cycle, 220 or 440 volts

125 H.P. G.E. 720 R.P.M. $750.00
100 H.P. G.E. 900 R.P.M. $600.00
80 H.P. G.E. 720 R.P.M. $450.00
60 H.P. G.E. 900 R.P.M. $325.00
50 H.P. G.E. 900 R.P.M. $275.00
40 H.P. G.E. 900 R.P.M. $225.00

Large variety of controllers, resistors, switches

UNITED HOISTING CO., INC.
Serving the Construction Industry for 47 Years
175 Locust Avenue, New York, N. Y.

SURPLUS EQUIPMENT

CRANES
1—10 Ton Gasoline Type, on Caterpillars.
3—20 Ton Locomotive Type, Standard Gauge.
1—30 to 40 Ton Locomotive Type, St. Ga.

ELECTRICAL EQUIPMENT
3—300 K.W. G.E. Rotary Converters.
1—300 K.W. G.E. Switchgear, Semi-Automatic (new).
3—300 K.W. G.E. Transformers.
15, 25 and 30 h.p. G.E. Type KT motors.

GOLD MACHINE (In Wyoming)
1—Complete Ainley Placer Gold Machine, 4 Bowl, Dragline Operation.

LOCOMOTIVES (Steam)
4—51 Ton Baldwins, 17x24, Standard Gauge.
1—60 Ton American, 20x26, Standard Gauge.
2—77 Ton Baldwins, 19x26, Standard Gauge.
4—80 Ton Porters, 22x26, Standard Gauge.
1—80 Ton Baldwin, 22x26, Standard Gauge.

SHOVELS (Diesel and Electric)
1—½ Yd. Thew Electric Type S, Mining Crawler Type.
1—3½ Yd. P & H Diesel 900, on Caterpillars.

DUMP CARS
175—20 Yd. Koppel and Western, Std. Ga.

PUMPS (Steam)
7—Camerons, 49 to 248 G.P.M.
1—Prescott Duplex, 8x5x10.

HOISTS (Electric Tugger)
65—6½ to 45 h.p. 220/440 volt, 3 phase, 60 cycle.

BOILER (Heating)
1—No. 750, Type C, Kewanee Steam Htg. Boiler.

BUTLER BROTHERS
Producers of Iron Ore
137 East 8th St. St. Paul, Minn.

FOR SALE

CRANE—Steam McMyler 20 ton capacity, double drum, bucket operating, 50′ boom. Good condition.

LOCOMOTIVE — Steam, American 40 ton, four wheel, saddle tank, overhauled.

MIXER—Smith tilting type 56 S. two cubic yard capacity concrete mixer, excellent condition.

E. E. FORT
1119 S. 56th St. Philadelphia, Pa.

RAILROAD EQUIPMENT

Hopper Cars **Gondola Cars**
Flat Cars **Box Cars**

Freight Car Replacement Parts.
Relaying Rails and Accessories.
We can furnish nationwide service.
Write—Wire—Phone us your inquiries.

HYMAN-MICHAELS COMPANY
122 S. Michigan Avenue
Chicago
Other Offices
Railway Exchange Building,
ST. LOUIS, MO.
625 Market Street,
SAN FRANCISCO, CALIF.
837 E. Gage Avenue,
LOS ANGELES, CALIF.

STANHOPE OFFERS!

AIR COMPRESSORS
BELTED: 355, 528, 676, 1000, 1300 & 1570 Ft.
ELECTRIC: 478, 676, 807, 1302, 1722 & 2850 Ft.
DIESEL: 105, 315, 420, 603, 807 & 1000 Ft.
PORTABLE GAS: 110, 160, 220, 310, 540 & 1300 Ft.
STEAM: 49, 310, 528, 1300 & 2200 Ft.

BUCKETS
50 Skips and Battleship Type, 2 to 6 Yds.
5 Owen & Bucyrus Rock Grabs.
CLAMSHELL: ½, ¾, 1, 1½ & 2 Yds.
ORANGE PEEL: ¾, 1, 1½, 2 & 3 Yds.
DRAGLINE: ¼, ½, 1, 1½ & 2 Yds. Cap.

CRANES & DRAGLINES
5 Ton BROWNHOIST, 30 ft. Boom Gas.
12 Ton NORTHWEST 50 Ft. Boom Gas.
12 Ton KOEHRING 45 Ft. Boom Gas.
16 Ton Speedcrane, Gas, 50 Ft. Boom.
25 Ton BROWNING & 30 Ton AMERICAN Locomotive.
25 Ton LINK BELT K-48 Electric, 70 Ft. Boom.
2¼ Yd. Lorain Model 95, Diesel Dragline.

CATERPILLAR SHOVELS
½ Yd. P. & H. Gas & ¾ Yd. Insley Gas.
¾ Yd. KOEHRING Gasoline.
¾ Yd., 1¼ Yd., 2 Yd., 4 Yd. & 8 Yd. MARION Electrics.
1 Yd. NORTHWEST Gas & 7/8B2 Steamer.
1½ Yd. BUCYRUS 41B Steamer.
1½ Yd. Lima 750 Diesel
1½ Yd. KOEHRING 601—Gas.

DUMP CARS
46—KOPPEL 1¼ Yd. 24 & 30 In. Ga., V Shaped.
15—2 Yd., 3 Yd., 4 Yd. 36 In. Ga.
20—Std. Ga. 12 Yd., 16 Yd., 20 Yd. & 30 Yd. Cap.

BALL, ROD AND TUBE MILLS
6x8 Continuous Pebble Mill.
5x5 Batch Mill.
5′x22″ HARDINGE CONICAL Dry Ball Mill.
6′x22″ HARDINGE CONICAL Pebble Mill.
4x8, 8x6, 10x9 Straight Ball Mills.
8′x22″ HARDINGE CONICAL Ball or Pebble Mill.
4x16, 5x18, 5x22, & 6x22 Tube Mills.
5½x18 & 5x7 Air Swept Tube Mills.
2x4½, 5x12 and 6x12 ROD MILLS.
4x16 Smidth Tube Mill Silex.
5½x20 Smidth Tube Mill Mang. Linck.
5½x18 P & M Tube Mill Silex.

PULVERIZERS
No. 1 Sturtevant Ring Roll.
RAYMOND Auto. Pulverizer No. 0000, 0 & 3.
RAYMOND Imp Mills No. 4, 32 & 55.
RAYMOND Imp Mills No. 3 & 4.
RAYMOND 4 & 5 ROLL MILLS & 5 Ft. Chaser Mill.

SEPARATORS AND COLLECTORS
14 ft., 8 ft. and 12 ft. Separators

ROLL CRUSHERS
36x60 Fairmont Single Roll.
36x16 Allis Chalmers Double Roll.
36x20 Diamond Double Roll.
24x14 Pioneer Double Roll.
24x12 P & M Double Roll.

JAW CRUSHERS
10x8, 13x7¼, 14x7, 15x9, 15x10, 16x9, 16x12, 16x10, 18x11, 20x8, 20x6, 20x10, 20x12, 20x11, 26x12, 30x15, 30x13, 36x30, 36x18, 36x14, 36x15, 36x9, 36x6, 38x18, 36x10, 36x24, 42x9, 48x36, 60x42, 84x66, 36x16, 9x36.
30x10 Gruendler Roller Bearing.

CONE & GYRATORY CRUSHERS
42 in. McCully Mammoth Gyratory.
18 in., 24 in., 30 in., 36 in. and 48 in. Symons Disc.
4—10 TZ Traylor 4 Ft. Gyratory.
4—Nos. 3, 3 & 6 Austin Gyratory.
2—Traylor T-12 Bulldog Gyratory.
8 in. Traylor T. Gyratory, Telsmith No. 9.
17 Gates K—Nos. 3, 4, 5, 6, 7½, 8 & 9½.
10 Inch Austin Model 105.
6, 10 & 13 Inch Superior McCullus.
KENNEDY: Nos. 19, 25, 27, 39 & 49.
16″ Traylor.
7 Ft., 5 Ft. and 3 Ft. Symons Cone.

DRILLS
4—SANDERSONS 14 & LOOMIS 44.
7—Ingersoll-Rand Wagon Drills, FB & M2
29T ARMSTRONG Well Drill.

HOISTING ENGINES
7 Gasoline 15, 40, 60 & 100 H.P.
17 Steam 7x10, 8½x10 and 10x12.
8 Electric 20, 35, 50, 60, 100 & 150 H.P.

HAMMER MILLS
4 Jeffreys: 24x18-A, 36x24-B, 42x36-E & 42x48-B.
Williams No. 1 Jumbo Jr., & No. 6 Universal.
Nos. 4, 5 & 8 Williams Jumbo.
No. 36 Am. Ring Roll.
Gruendler No. 6X.

STEEL BINS
72 Ton BLAW-KNOX 2 Compt.: also 250 ton.
100 Ton BLAW-KNOX 2 Compt.

CEMENT BIN
400 Bbl. Portable BUTLER Bulk Cement Bin with Fuller Full Automatic Electric Push Button Weigh Hatcher.

SYNCHRONOUS MOTOR GENERATORS
100 K.W. RIDGWAY 3/60/2200-250-275 volt
150 K.W. GEN. ELEC. 3/60/2200-250-275 volt
200 K.W. RIDGWAY 3/60/2200-250-275 v., 900 rpm.

SLIP RING ELECTRIC MOTORS
52 H.P. GEN. ELEC. 3/60/220-440 v., 1200 rpm.
(3) 100 H.P. GEN. ELEC. 3/60/220-440 v., 900-1200 rpm.

RUBBER HOSE
Air: ¼ in. to 11½ in. Water: ⅝ in. to 10 in.

CONVEYOR PARTS
BELT: 1000 Ft. 60 In., 700 Ft. 42 In., 600 Ft. 36 In., 800 Ft. 30 In., 1642 Ft. 24 In., 517 Ft. 20 In., 297 Ft. 18 In., 1000 Ft. 14 In. & 16 In.
IDLERS: 36 In., 30 In., 24 In., 20 In., 18 In.
Head & Tail—Pulleys—Takeup for all sizes.
Steel Frames: 2,000 ft. 24 In., 30 In. & 36 In. Sections.

ROTARY DRYERS AND KILNS
36 In. x 20 Ft., 3 Ft. x 30 Ft., 4 Ft. x 30 Ft., 54 In. x 30 Ft., 42 In. x 24 Ft., 5 Ft. x 30 Ft., 5 Ft. x 16 Ft., 5 Ft. x 60 Ft., 6 Ft. x 60 Ft., 6 Ft. x 70 Ft., 70 In. x 40 Ft., 5x30 & 8x84 Double Shell Dryers, 8x110, 7½x100, 8x125 & 10x20 Kilns.

STEEL DERRICKS
GUY: 8 Ton 85 Ft. Boom, 15 Ton 100 Ft. Boom, 20 Ton 115 Ft. Boom, 50 Ton 100 Ft. Boom.
STIFF LEG: 5 Ton 70 Ft. Boom, 15 Ton 100 Ft. Boom, 25 Ton 100 Ft. Boom, 75 Ton 135 Ft. Boom.

LOCOMOTIVES
DIESEL: 7—41½ and 8 Ton 36 & 42 In. Ga.
GASOLINE: 3 Ton, 5 Ton, 8 Ton, 12, 14 & 30 Ton.
STEAM: 9 Ton, 20 Ton, 40 Ton, 60 Ton & 80 Ton.
ELECTRIC: 2 Ton, 5 Ton, 8 Ton, 17 Ton & 40 Ton.

SCREENS
VIBRATING: 2x4, 3x6, 2x8, 3x8, 3x5, 4x5, 4x8, 4x10, 48x72, HUMMER, ROTEX, NIAGARA & ROBINS, LINK BELT & HURON.
REVOLVING: 3x12, 3x16, 3½x18, 3x24, 4x16, 4x20, 4x23, 4x24, 5x30, 5x20, 6x20.

SAND WASHERS AND CLASSIFIERS
4 LINK-BELT A-60 In. Classifiers.
7 ALLEN Cones 4 Ft., 5 Ft., 6 Ft., 8 Ft. TELSMITH 13 Ft. by 2 Ft. 8 In. Screw Washer.

RAILROAD CARS
12—50 Ton Cap. Battleship Gondolas.
7—50 Ton Cap. Flat Cars.

SAUERMAN DRAG AND SLACKLINES
1—¾ yd. Gas 1—1½ yd. Electric
1—1 yd. Electric 3—2 yd., 3 yd. & 4 yd. Electric

42 IN. BELT CONVEYOR
350 Ft. Barber-Greene Sectional Steel Frame Roller Bearing Belt Conveyor, New 1939.

JACK HAMMERS AND DRIFTERS
21 Worthington 169 Drifters.
12 Worthington 180 Drifters.
6 Gardner-Denver 15 Jackhammers.
45 Ingersoll-Rand Drifters S70, N75, X71, DA35.
11 Ingersoll-Rand S49 Jackhammers.

R. R. TRACK SCALE
125 Ton 56′ x 10′6″ Platform 4 Section.

GRIFFIN MILL
Bradley Giant Griffin Mill.

DIESEL UNITS
96 H.P. Waukesha Hesselman.
2—370 H.P. Chgo. Pneu. RHA4SS, 360 rpm.
420 H.P. Sulzer, 1000 rpm.
600 H.P. B. & W., 550 rpm.

CONE CRUSHERS
Symons No. 5½ and 7 Ft.

R. C. STANHOPE, INC.
(Cable Address: "STANEQUIP" New York)
575 6TH AVENUE, NEW YORK N. Y.
Pennsylvania 6-3565 or 6-3566

CRANES—DRAGLINES—SHOVELS

1—**Link Belt** K-55 **Gasoline Dragline,** 70′ Boom.
1—**Bucyrus-Erie** 2 yd. **Diesel Shovel** with Crane Boom and dragline fairleads. Lifting capacity 40-tons.
1—**Northwest** Mod. 6 **Comb. Shovel & Dragline,** Caterpillar Diesel Engine, 1¾ yd. dipper, 80′ Crane Bm.
1—**Industrial Brownhoist** Model DC **Gasoline operated crane.** 60′ Boom. Capacity 15-tons.
1—**Koehring** Model 501 gasoline. **Combination Shovel and Crane.** 50 ft. Boom. 1¼ yard dipper.
1—**#2 Brownhoist Gasoline Crane.** 40′ Boom. 10-ton capacity.
1—**Lorain** 75-B **Gasoline Crane** with 40′ Boom.
1—**Little General Shovel and Crane**—½ yard capacity—gasoline.

MODERN LOCOMOTIVE CRANES

1—**Industrial Brownhoist** 25-ton **Gasoline.** 50′ boom. New 1931. 8-Wheel MCB Trucks. Excellent condition.
1—**Browning** 25-ton **Steam Locomotive Crane,** 50 ft. boom. 8-Wheel MCB Trucks. Oil fired Boiler. Used less than three years on light work and condition like new.
3—**Browning** 20-ton **Steam.** 8-Wheel MCB Trucks. Purchased new in 1935. Condition perfect.
All the above cranes are suitable for clamshell bucket or hook work.

ATLANTIC EQUIPMENT CORP.
50TH AND GRAYS AVE.
PHILADELPHIA, PA.
Tel. Evergreen 6363

FOR SALE

Crushers—Jaw and Gyratory.
Air Compressors.
No. 2 Williams Jumbo Jr. Hammermill.
1½ yd. Koehring Shovel.
88 H.P. Caterpillar Diesel Engine.
Model 25 Parson Ditcher, 10 ft.
Model 42 Barber-Greene Bucket Loader.
Haiss Loader.
500 ft. of 36″ 7 Ply New Conveyor Belt.
500 ft. of 18″ 5 Ply New Conveyor Belt.

BLUE BALL MACHINE WORKS
Blue Ball, Pa.

5 W Monighan Walker (diesel).
No. 5 Northwest combination shovel and crane.
Dravo 10 ton steam Whirley.
Gas Air Erie combination shovel and crane.
1030 Bucyrus shovel and crane.
2—360 cu. ft. Worthington compressors.
2—420 cu. ft. Ingersoll Rand XL compressors.
2—30 ton steel stiff leg derricks.
3—NE 2 gunite cement guns.
1—80 ton Johnson bins with scales and batchers.
2—ASME code air receivers.
2—10x12 three drum engines with boilers.
2—27 E road pavers.
1—Burry low pressure belted air compressor.

ACME EQUIPMENT COMPANY
Route 8, Burchfield Rd. Allison Park, Pa.

PAY LOADS *and* PROFITS

No ordinary buckets are the Industrial Brownhoist Clamshells. From tip to digging teeth they are as finely built as thirty years experience and modern engineering makes possible. The result . . . out on your work . . . is bigger output, lower upkeep cost and, most important, increased profits.

Your operator will get the most out of his crane when it's equipped with an Industrial Brownhoist Clamshell . . . and you'll get a bigger return on your crane investment. Complete facts are contained in Catalog 353. Want a copy?

INDUSTRIAL BROWNHOIST GENERAL OFFICES: BAY CITY, MICHIGAN
DISTRICT OFFICES
New York, Philadelphia, Pittsburgh, Cleveland, Chicago,

Index to Advertisers

*American Cable Div. American Chain & Cable Co., Inc. ..Inside Back Cover
*American Chain & Cable Co., Inc. 9-10 Inside Back Cover
*American Pulverizer Co. ... 88
Anchor Concrete Machy. Co. ... 74
Atlantic Equipment Corp. ... 97
Atlas Powder Co. ... 2

Bacon, Inc., Earle C. ... 62
*Barber-Greene Co. ... 11
*Bay City Shovels, Inc. ... 16
Birmingham Rail & Locomotive Co. 93
*Blaw-Knox Co. ... 78-80
Bristol Company, The ... 87
Broadcast Section ... 92-97
Brooklyn Contractors Machy. Exchange, Inc. ... 96
*Brooks Equipment & Mfg. Co. ... 60-91
*Bucyrus-Erie Co. ... 14
*Bucyrus-Monighan Co. ... 14
Burnham, Royal E. ... 94
Butler Brothers ... 97

Carlyle Rubber Co., Inc. ... 92
Chicago Perforating Co. ... 60
*Chicago Pneumatic Tool Co. ... 86
*Chicago Steel Foundry Co. ... 66
*Cincinnati Rubber Mfg. Co. ... 55
Cleveland Wire Cloth & Mfg. Co. ... 91
Clyde Iron Works, Inc. ... 78
Commercial Shearing & Stamping Co., The ... 74
Concrete Transport Mixer Co. ... 77
Consolidated Products Co., Inc. ... 93
Cummer & Son Co., The F. D. ... 89

*Deister Concentrator Co. ... 62
*Dempster Bros., Inc. ... 4
*Diamond Iron Works, Inc. ... 88
Dixon Valve & Coupling Co. ... 65
Dreifus Co., Charles ... 93
Dunn Mfg. Co., W. E. ... 79

*Ensign-Bickford Co., The ... 6
Equipment Corporation of America. 95
Erie Steel Constr. Co. ... 81

Flexible Steel Lacing Co. ... 89
Ford Motor Co. ... 85
*Fuller Co. ... 8

Gates Rubber Company ... 3
Goodman, Al. J. ... 95
Grey Steel Products Co., Inc. ... 95
*Gruendler Crusher & Pulverizer Co. 58

*Haiss Mfg. Co., Inc., Geo. ... 5
*Hazard Wire Rope Div. American Chain & Cable Co., Inc. ... 9-10
*Hendrick Mfg. Co. ... 88
Hetherington & Berner, Inc. ... 98
Hoffman Bros. Drilling Co. ... 94

Industrial Brownhoist ... 98
*Iowa Manufacturing Co. ... 88

*Jackson & Church Co. ... 78
Jaeger-Lembo Machine Corp. ... 96
*Jaeger Machine Co. ... 77
*Jeffrey Mfg. Co. ... 81

Kelley Co., Inc., E. B. ... 95
Kent Machine Co. ... 71
*Koehring Company ... 83

Laughlin Co., The Thomas ... 56
Lewis, Harry C. ... 95
Lewistown Foundry & Machine Co. 80
*Link-Belt Co. ... 1
Lippman Engineering Works ... 93
Ludlow-Saylor Wire Co. ... 88

Manhattan Rubber Mfg. Div. of Raybestos Manhattan, Inc. ... 88
Marion Steam Shovel Co., The ... 13
Marmon-Herrington, Inc. ... 54
*McLanahan & Stone Corp. ... 91
McLeod, Alex T. ... 92
*Merrick Scale Mfg. Co. ... 66
Miles Mfg. Co., The ... 89
*Morris Machine Works ... 91
*Multiplex Concrete Machy. Co. ... 76

National Industrial Advertisers Assn 84
Naylor Pipe Co. ... 86
New Holland Machine Co. ... 63
*Nordberg Mfg. Co. ... 91
Northwest Engineering Co. ... 7

Osgood Company, The ... 56
Owen Bucket Co., The ... Back Cover

Page Engineering Co. ... 57
Pennsylvania Drilling Co. ... 94

Quinn Wire & Iron Works ... 81

Railway Accessories Co. ... 93
*Raymond Pulverizer Div. of Combustion Engineering Co., Inc. ... 18
Reed Company, R. F. ... 80
Republic Rubber Division of Lee Rubber and Tire Corp. ... 4
*Robins Conveying Belt Co. ... 89
*Roebling's Sons Co., John A. ... 15-59

*Sauerman Bros., Inc. ... 77
Screen Equipment Co., Inc. ... 56
Simplicity Engineering Co. ... 91
*Sly Manufacturing Co., The W. W. 65
*Smidth & Co., F. L. ... 91
Smith Engineering Works Inside Front Cover
*T. L. Smith Co., The ... 79
Southern Iron & Equipment Co. ... 95
Stanhope, Inc., R. C. ... 97
*Stearns Mfg. Co. ... 82
Stonex Industries ... 77
Stulz-Sickles Co. ... 58

Taylor Forge & Pipe Works ... 61
*Traylor Engineering & Mfg. Co. ... 87
*Tyler Co., W. S., The ... 61

Union Wire Rope Corp. ... 89
United Hoisting Co., Inc. ... 97
Unversagt, G. A. ... 95

Walsh Co., R. P. ... 93
*Warren Bros. Roads Co. ... 87
Wellman Engineering Co. ... 63

Zagelmeyer Cast Stone Block Machy. Co. ... 80

***See also Detail Information in the 1940 Pit and Quarry HANDBOOK**

COMPLETE HYDRAULIC DREDGES

SAND AND GRAVEL DREDGING PUMPS
AGITATING MACHINERY
DREDGE HOISTS
STEEL HULLS • PONTOONS
PIPE LINE ACCESSORIES

HETHERINGTON & BERNER, INC.
701-745 KENTUCKY AVENUE -- -- -- -- INDIANAPOLIS, IND.

FEB 1 1941

in Business for Your Safety

AMERICAN CABLE
TRU-LAY *Preformed* WIRE ROPE

THE TRUE STORY OF A SLOGAN—

Most slogans for business organizations are coined phrases designed to help sell either merchandise or service. Our slogan, "*In Business for Your Safety,*" voices this company's policy; this organization's spirit.

More than thirty years ago Weed Tire Chains were put on the market to make motoring safer. Thus the American Chain and Cable Company was conceived in Safety and has always been dedicated to that ideal. Today ACCO products are to be found serving faithfully and safely in nearly every field.

Fifteen years ago we introduced preformed wire rope—American Cable TRU-LAY. We did so not only because preforming made TRU-LAY a rope of longer service but—a safer rope. TRU-LAY Preformed is safer to handle; safer to use. The heritage of safety is a tradition with American Chain and Cable men. The entire organization stands as a single unit behind the true meaning of "*In Business for Your Safety.*"

BUY ACCO QUALITY *whether it is American Cable Wire Rope and Slings—American Chains (Weed Tire Chains, Welded and Weldless Chains)—Campbell Abrasive Cutting Machines—Ford Chain Blocks—Page Wire Fence—Page Welding Wire—Page Traffic Tape—Reading-Pratt & Cady Valves—or any other of the 137 ACCO Quality Products.*

AMERICAN CABLE DIVISION • WILKES-BARRE, PENNSYLVANIA

District Offices: Atlanta, Chicago, Detroit, Denver, Los Angeles, New York, Philadelphia, Pittsburgh, Houston, San Francisco

AMERICAN CHAIN & CABLE COMPANY, INC.

to Handle

MAXIMUM YARDAGE at MINIMUM-cost

consult

OWEN

The known ability of Owen Buckets to move vast quantities of various materials at low cost has now been further improved.

Advanced design and increased capacity for every material handling requirement.

Lighter alloys with electric welding materially increase the output of all cranes.

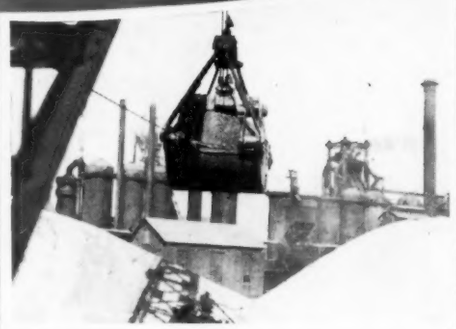
Larger grit-proof bearings assure longer service of dredging buckets.

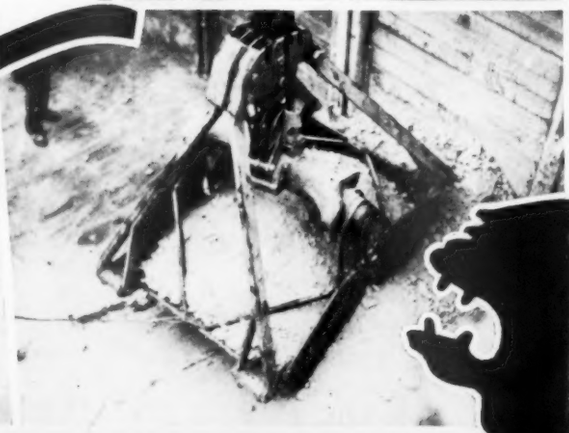
Why not check the actual operating costs of your present equipment with the lower costs of these advanced buckets? You may find it profitable to replace some equipment that you now consider quite satisfactory.

The OWEN BUCKET Co.

6050 BREAKWATER AVE, CLEVELAND, OHIO

BRANCHES: New York, Philadelphia, Chicago
Berkeley, Calif.





A MOUTHFUL AT EVERY BITE